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WILDLIFE HABITAT INVENTORY

Kaiparowits Powerline Right of Way

Riverside District

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Prepared by:
Allen Cooperrider
District Wildlife Biologist
June 1975

WILDLIFE HABITAT INVENTORY

KAIPAROWITS POWERLINE RIGHT OF WAY

RIVERSIDE DISTRICT

This report compiles data on the Kaiparowits Power Transmission Corridor. The information was collected for the California section of the Environmental Impact Statement for the Kaiparowits Power Project. The transmission line for this project runs from the Kaiparowits Generating Plant in Utah to the Serrano Substation in Orange County, California.

The Information for this inventory was gathered, primarily from literature reviews, in the fall of 1974, and is summarized here for future use in Environmental Analysis Reports and Environmental Impact Statements on future right-of-way applications on the same corridor.

The primary route is 267 miles long. Considering the right-of-way as 1/5 mile wide, the inventory covered 53 square miles or approximately 33,920 acres. This inventory was extensive in nature and will require more intensive work and updating for use in future environmental statements.

I. Description of the Area

The transmission lines enter California from the Mojave, Nevada Station. The right-of-way travels southwest and then south in Ward Valley, just east of the Old Woman Mountains. It then turns southwesterly around the Iron Mountains, and crosses Coxcomb Mountains. The corridor deflects westerly, crosses part of Hayfield Lake (dry), and continues south of the southern boundary of Joshua Tree National Monument. It skirts the southern edge of

the Little San Bernardino Mountains turning northwesterly and goes north of the Indio Hills to the Devers Substation.

From the Devers Station the corridor travels west through the San Gorgonio Pass to a point south of Beaumont where it turns southwest. After crossing the Lakeview Mountains the route again turns west to the base of the Santa Ana Mountains. It travels northwest near Temecuala, turns west again and crosses the Santa Ana Mountains. West of this range the corridor turns north westerly and terminates at the Serrano Substation.

The route is shown in Appendix A.

II. Abiotic Features

The study area can be broken into two broad areas separated by the San Bernardino and Santa Rosa Mountains.

West of the mountains, the areas have a mediterranean climate. Rainfall is 12-20 inches per year, usually in winter and early spring. Temperature extremes are mitigated by the proximity of the Pacific Ocean.

The areas east of the mountains are in an orographic desert. Rainfall is usually less than 10 inches per year. Temperatures range to over 120° F. in summer.

III. Vegetation

The areas encompass eight plant communities. Two of these are human-use communities (Urban-agricultural and Urban-agricultural with isolated pockets of undisturbed Coastal Sage Scrub and Chaparral). Two others are found on the alternative routes and will not be extensively covered.

A. Coastal Sage Scrub - This community covers some 4% of the corridor. The most common plants are Salvia apiana, Artemesia californica,

Avena barbata and Eriogonum fasciculatum.

B. Chaparral - This community is found on the uplands above the Coastal Sage Scrub on the western side of the ranges. It covers about 7% of the route. The common plants are Adenostoma fasciculatum, Arctostaphylos spp., Quercus dumosa and Ceanothus spp.

C. Soft Chaparral - This community is an intergrate between the Chaparral and Coastal Sage Scrub, is found in 9% of the corridor. The plants found here are species found in both aforementioned communities.

D. Creosote Bush Scrub - This is the most common community of this rain shadow desert. It covers 58% of the corridor. Vegetation is sparse and much has less than 50% cover. The more common plants are Larrea divercata, Hymenoclea salsola and Ambrosia dumosa.

E. Ocotillo - Paloverde - Ironwood Association - This area is found mainly south of Joshua Tree National Monument along 12% of the route. Here vegetation is sparse and cover is usually less than 50%. The dominant species here are Olneya tesota, Cericidium floridium, and Fouquieria splendens.

F. Alkali Sink Scrub - This community is found where desert runoff ends at dry lakes. The saline content is high in the soil. Only 20% of the corridor crosses this association. The dominant plants are Atriplex spp. and Suaeda spp.

G. Unusual Vegetational Areas - These are areas with standing or near surface water. Three such areas exist along the proposed powerline route.

(1) Willow Hole - This area is a small alkaline wash at the north end of the Indio Hills. The ridges of the wash are covered with catclaw (Acacia greggii) and creosote-bush (Larrea divericata). The wash is densely packed with arrowweed (Pulchea serica) and saltbush (Atriplex spp.). Approximately fifteen fan palms (Washingtonia filifera) are scattered in clumps along the wash. This association is uncommon in our deserts

(2) Thousand Palms Oasis - This is an unusual area due to the presence of standing water. The vegetation consists of fan palms (Washingtonia filifera), catclaw (Acacia greggii), mesquite (Prosopis spp.), cat-tail (Typha spp.) and other plants associated with standing water. The association is uncommon in the desert.

(3) Pushawalla Canyon - A spring located here provides water for plants otherwise excluded from the desert. The vegetation is similar to Thousand Palms Oasis described above.

Plant communities along the proposed route are shown in Appendix A, and are described in more detail in Appendix C.

IV. Wildlife

A list of wildlife species by vegetation type found along the proposed powerline route is given in Appendix B. This table was prepared primarily from a review of the literature. A more thorough discussion of the wild-

life species along the route is found in Appendix C.

Several rare, endangered or unique species occur along the powerline. These are shown in Appendix B, Table 2 and discussed further in Appendix C.

V. Summary

This report compiles data that was collected for an Environmental Impact Statement on the Kaiparowits Power Transmission Corridor. The information was collected in the fall of 1974 and is summarized here for future use. Most of the information is contained in Appendices A - C which contain the material in essentially the same form in which it was submitted for the draft EIS.

VI. Bibliography

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VII. Appendices

A. Map of Plant Communities Along Proposed Transmission Line

B. List of Wildlife Species Found Along Proposed Transmission Line

C. EIS Material Submitted For Vegetation and Wildlife For Proposed Transmission Line

D. Forest Service Guidelines For Clearing, Landscaping and Erosion Control in Cleveland National Forest

E. List of Threatened and/or Unique Wildlife Along Kaiparowits Transmission Line

F. Powerline Standards For Reducing Raptor Losses

G. Southern California Edison Company, EIS Material on Vegetation and Wildlife

APPENDIX A

Map of Plant Communities

Along Proposed Transmission Line

Key to Plant Communities Along
Mojave to Serrano Power Line

Urban-Agricultural

Urban-Agricultural with isolated pockets of undisturbed coastal sage scrub or chaparral

Coastal Sage Scrub

Chaparral

Soft Chaparral

Creosote Bush Scrub

Creosote-Cheese Bush-Burro Bush

Ocotillo-Palo Verde Desert Ironwood

Creosote - Saltbush

Joshua Tree Woodland

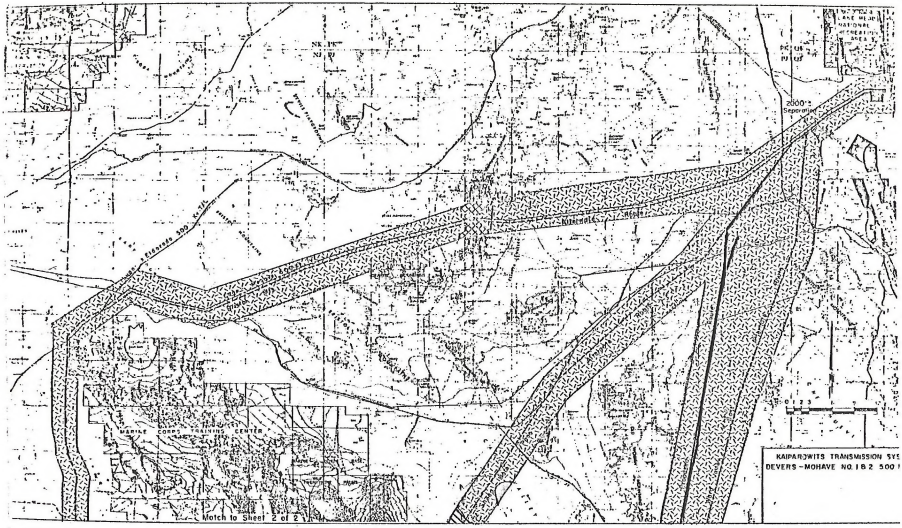
Alkali Sink Scrub

Pinyon-Juniper Woodland

APPENDIX B

List of Wildlife Species

Found Along Proposed Transmission Line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KAIPAROWITS TRANSMISSION SYS
DEVERS – MOHAVE NO. 1 & 2 500 k
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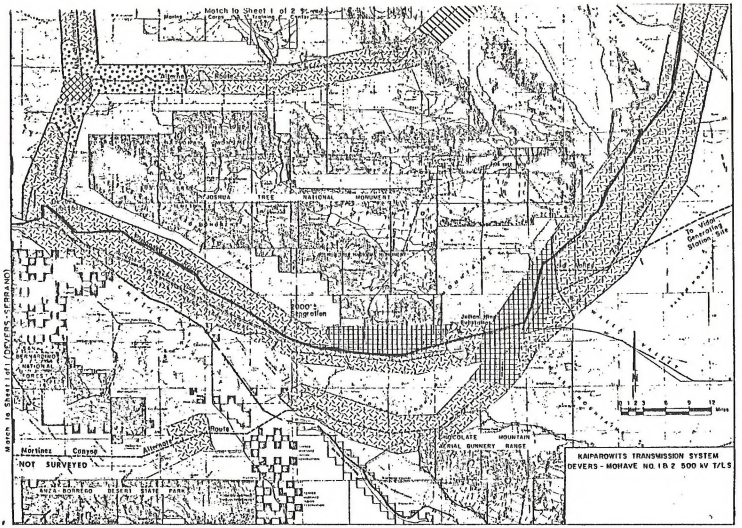
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JOSHUA TREE NATIONAL MONUMENT
Hoops Springs
Jelleff Jeep Trail
Mortimer Canyon
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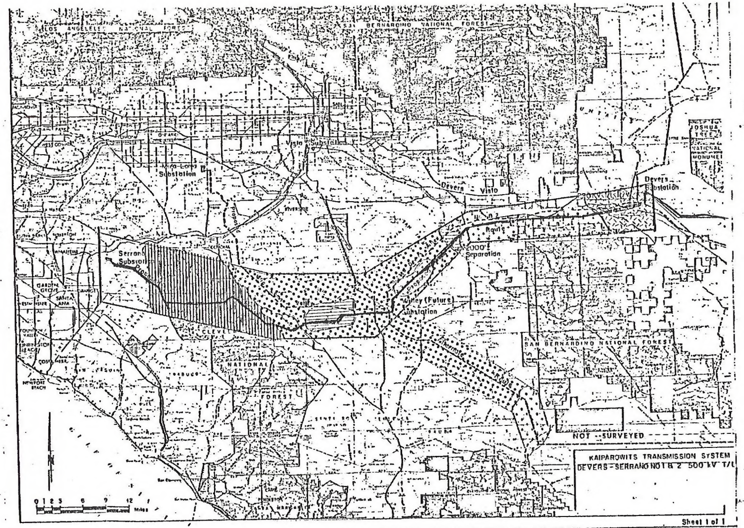
Alternate Route
CHOCOLATE MOUNTAIN AERIAL GUNNERY RANGE
ANZA-BORREGO DESERT STATE PARK
To Vidal Generating Station
KAIPAROWITS TRANSMISSION SYSTEM
DEVERS - MOHAVE NO. 1 & 2 500 kV T/LS
Sheet 2 of 2



SAN BERNARDINO NATIONAL FOREST
Vista Substation
Mira Loma Substation
Devers - Vista
Devers Substation
Serrano Substation
Valley (Future) Substation
2000' Separation
GARDEN GROVE
SANTA ANA
ANAHEIM
RIVERSIDE
NEWPORT BEACH
CLEVE
NATIONAL
FOREST
SAN BERNARDINO NATIONAL FOREST
NOT SURVEYED
JOSHUA TREE NATIONAL MONUMENT
KAIPAROWITS TRANSMISSION SYSTEM
DEVERS - SERRANO NO 1 & 2 500 kV T/L
Miles
Sheet 1 of 1

Appendix B

Table I

Wildlife Observed or
Expected Along Kaiparowits
Transmission Line

MAMMALS	Creosote Bush Scrub	Coastal Sage Scrub	Chaparral	Pinyon-Juniper	Joshua-Tree Woodland	Urban Agriculture
Virginia Opossum (Didelphis marsupialis)			X			X
Ornate shrew (Sorex ornatus)		X	X			
Gray shrew (Notiosorex crawfordi)	X	X	X			
California mole (Scapanus latimanus)		X	X			
California leaf-nosed bat (Macrotus californicus)	X	X	X	X	X	
Western yellow bat (Dasypterus ega)	X					
Long-eared bat (Corynorhinus rafinesqui)	X	X	X			
Western pipistrelle (Pipistrellus hesperus)	X	X	X			
Yuma myotis (Myotis yumanensis)	X	X	X	X	X	
California myotis (Myotis californicus)	X	X	X	X	X	X
Long-eared myotis (Myotis ~~californicus~~ evotis)				X	X	
*Pocketed freetailbat (Tadarida femorosacca)	X					
Mexican free-tailed bat (Tadarida mexicana)		X				
Pallid bat (Antrozous pallidus)		X	X			
Hoary bat (Lasiurus cinereus)		X	X	X	X	
Big brown bat (Eptesicus fuscus)			X	X	X	
*Spotted bat (Euderma maculata)	X					
Ratoon (Procyon lotor)		X	X			X
Ring-tailed cat (Bassariscus astustus)		X	X			
Long-tailed weasel (Mustela frenata)		X	X	X	X	
Spotted skunk (Spilogale gracilis)		X	X			X
Striped skunk (Mephitis mephitis)	X	X	X			X
Badger (Taxidea taxus)	X	X	X	X	X	
Gray fox (Urocyon cinereoargenteus)		X	X			
*Kit fox (Vulpes macrotis)	X			X	X	
Coyote (Canis latrans)	X	X	X	X	X	
Bobcat (Lynx rufus)		X	X	X	X	
*Mountain lion (Felis concolor)		X	X	X		
Merriam chipmunk (Eutamias merriami)				X		

Table /

Wildlife Observed or

Expected Along Kaiparowits

Transmission Line

MAMMALS	Creosote Bush Scrub	Coastal Sage Scrub	Chaparral	Pinyon-Juniper	Joshua-Tree Woodland	Urban Agriculture
Valley pocket gopher (Thomomys bottae)	X	X	X	X	X	
Round-tailed ground squirrel (Spermophilus tereticaudus)	X				X	
Antelope ground squirrel (Ammospermophilus leucurus)	X				X	
Beechey ground squirrel (Spermophilus beecheyi)		X	X			X
Long-tailed pocket mouse (Perognathus formosus)	X			X		
Desert pocket mouse (Perognathus penicillatus)	X					
Short-eared pocket mouse (Perognathus fallax)	X	X				
Spiny pocket mouse (Perognathus spinatus)	X					
California pocket mouse (Perognathus californicus)			X			
Little pocket mouse (Perognathus longimembris)	X	X		X		
*Stephens kangaroo rat (Dipodomys stephensi)		X				
Nimble kangaroo rat (Dipodomys agilis)		X	X			
Merriam kangaroo rat (Dipodomys merriami)	X					
Desert kangaroo rat (Dipodomys deserti)	X					
Panamint kangaroo rat (Dipodomys panamintinus)	X			X	X	
Western harvest mouse (Reithrodontomys megalotis)	X	X	X	X	X	X
Cactus mouse (Peromyscus eremicus)	X					
Canyon mouse (Peromyscus crinitus)	X					
Deer mouse (Peromyscus maniculatus)	X	X	X	X	X	X
California mouse (Peromyscus californicus)			X			
Brush mouse (Peromyscus boylei)			X			
California vole (Microtus californicus)		X	X			
White-throated woodrat (Neotoma albigula)	X					
Dusky-footed woodrat (Neotoma fuscipes)		X	X			
Desert wood rat (Neotoma lepida)	X					
Black-tailed jackrabbit (Lepus californicus)	X	X	X		X	X
Audubon cottontail (Sylvilagus auduboni)		X				X
Brush rabbit (Sylvilagus bachmani)			X			
*Bighorn sheep (Ovis canadensis)	X					

Table /

Wildlife Observed or

Expected Along Kaiparowit s

Transmission Line

MAMMALS	Creosote Bush Scrub	Coastal Sage Scrub	Chaparral	Pinyon-Juniper	Joshua-Tree Woodland	Urban Agriculture
Mule deer (Odocoileus hemionus)		X	X	X		

Table /

. Wildlife Observed or

Expected Along Kaiparowits

Transmission Line

BIRDS	Creosote Bush Scrub	Coastal Sage Scrub	Chaparral	Pinyon-Juniper	Joshua-Tree Woodland	Urban Agriculture
Turkey vulture	X	X	X	X	X	
Cooper's hawk (Accipiter cooperi)		X	X			
Sharp-shinned hawk (Accipiter striatus)			X			
Ferruginous hawk (Buteo regalis)	X	X				
Red-tailed hawk (Buteo jamaicensis)	X	X				
Red-shouldered hawk (Buteo lineatus)		X	X			
Golden eagle (Aquila chrysaetos)	X					
*Bald eagle (Haliaetus leucocephalus)		X				
*Peregrine falcon (Falco peregrinus)						
Prairie falcon (Falco mexicanus)	X					
Sparrow hawk (Falco sparverius)		X				X
Mountain plover (Eupodo montanus)	X	X				
Gambel's quail (Lophortyx gambelii)	X					
California quail (Lophortyx californicus)		X	X			
Mountain quail (Oreortyx pcitus)			X			
Chukar (Alectoris graeca)	X					
Band-tailed pigeon (columba fasciata)			X			
Rock dove (columba livia)						X
Mourning dove (Zenaidura macroyra)	X	X		X	X	X
White-winged dove (Zenaida asiatica)	X					
Spotted dove (Streptopelia chinensis)		X				X
*Yellow-billed cuckoo (Coccyzus americanus)	X	X				
Roadrunner (Geococcyx californianus)	X	X	X			
Screech owl (Otus asio)	X			X	X	X
Great horned owl (Bubo virginianus)	X	X	X	X		
Barn owl (Tyto alba)		X				
Lesser nighthawk (Chordeiles acutipennis)	X	X				
Poor-will (Phalaenoptilus nuttallii)	X	X	X	X		
White-throated swift (Aeronautes saxatilis)	X	X	X			

Table /

Wildlife Observed or

Expected Along Kaiparowits

Transmission Line

BIRDS	Creosote Bush Scrub	Coastal Sage Scrub	Chaparral	Pinyon-Juniper	Joshua-Tree Woodland	Urban Agriculture
Black-chinned hummingbird (Archilochus alexandra)		X	X			
Rufous hummingbird (Selasphorus rufus)		X				
Costa's hummingbird (Calypte costae)	X					
Anna's hummingbird (Calypte anna)		X	X			
Nutall's woodpecker (Dendrocopus nuttalli)		X	X			
Ladderbacked woodpecker (Dendrocopus scalaris)		X	X			
Red-shafted flicker (Colaptes cafer)		X	X			
Western kingbird (Tyrannus verticalis)		X		X	X	
Ash-throated flycatcher (Myiarchus cinerascens)	X	X	X	X	X	
Say's pheobe (Sayornis saya)	X	X				
Horned lark (Eremophila alpestris)	X	X				
Scrub jay (Aphelocoma coerulescens)		X	X	X	X	
Common raven (Corvus corax)	X			X	X	
Common crow (Corvus brachyrhynchos)		X				X
Common bushtit (Psaltiparus minimus)		X	X	X	X	
Verdin (Auriparus flavicens)	X					
Mountain chickadee (Parus gambeli)				X	X	
Plain titmouse (Parus inornatus)		X	X	X	X	
Wrentit (Chamaea fasciata)			X			
Bewick's wren (Thryomanes bewickii)		X	X	X	X	
Rock wren (Salpinetes obsoletus)		X				
Cactus wren (Camphylorhynchus brunneicapillus)	X				X	
Mockingbird (Mimus polyglottos)	X	X		X	X	X
Le Conte's Thrasher (Toxostoma lecontei)	X				X	
California thrasher (Toxostoma redivivum)		X	X			
Western robin (Turdus migratorius)			X			X
Black-tailed gnatcatcher (Polioptila melanura)	X	X	X			
Loggerhead shrike (Lanius ludovicianus)	X	X		X	X	
Starling (Sturnus vulgaris)						X

Table /

Wildlife Observed or

Expected Along Kaiparowits

Transmission Line

BIRDS	Creosote Bush Scrub	Coastal Sage Scrub	Chaparral	Pinyon-Juniper	Joshua-Tree Woodland	Urban Agriculture
Gray vireo (Vireo vicinior)				X	X	
Orange-crowned warbler (Vermivora celata)			X			
Lucy's warbler (Vermivora lucine)	X					
Audubon warbler (Dendroica auduboni)		X	X			
Black-throated gray warbler (Dendroica nigrescens)				X	X	
McGillavray's warbler (Opornis tolmiei)			X			
Wilson's warbler (Wilsonia pusilla)			X			
House sparrow (Passer domesticus)						X
Brewers blackbird (Euphagus cyanocephalus)		X				X
Western meadowlark (Sturnella neglecta)		X				
Brown-headed cowbird (Molothrus ater)		X				X
Scott's oriole (Icterus parisorum)	X			X	X	
Lazulibunting (Passerina amoena)		X	X			
House finch (Carpodacus mexicanus)	X	X				X
American goldfinch (Spinus tristis)		X	X			
Lesser goldfinch (Spinus psaltria)		X	X			
Lawrence's goldfinch (Spinus lawrencei)		X				
Abert's towhee (Pipilo aberti)	X					
Rufous-sided towhee (Pipilo erythrophthalmus)		X	X			X
Brown towhee (Pipilo fuscus)		X	X			X
Green-tailed towhee (Chlorura chlorura)		X	X			
Black-throated sparrow (Amphispiza bilineata)	X					
Brewer's sparrow (Spizella breweri)	X	X				
White-crowned sparrow (Zonotrichia leucophrys)	X	X	X			
Fox sparrow (Passerella iliaca)		X	X			

Table /

Wildlife Observed or

Expected Along Kaiparowits

Transmission Line

AMPHIBIANS	Creosote Bush Scrub	Coastal Sage Scrub	Chaparral	Pingon-Juniper	Joshua-Tree Woodland	Urban Agriculture
California newt (*Taricha torosa*)		X	X			
Ensatina (*Ensatina eschscholtzi*)		X	X			
California slender salamander (*Batrachoseps attenuatus*)		X	X			
Pacific slender salamander (*Batrachoseps pacificus*)			X			
Western spadefoot toad (*Scaphiopus hammondi*)		X	X			
Western toad (*Bufo boreas*)	X	X	X			
Southwestern toad (*Bufo microscaphus*)		X	X			
Great plains toad (*Bufo cognatus*)	X			X	X	
Red-spotted toad (*Bufo punctatus*)	X			X	X	
Pacific treefrog (*Hyla regilla*)		X	X			
Red-legged frog (*Rana aurora*)		X	X			
Bullfrog (*Rana catesbeiana*)						

Table /

Wildlife Observed or
Expected Along Kaiparowits
Transmission Line

REPTILES	Creosote Bush Scrub	Coastal Sage Scrub	Chaparral	Pinyon-Juniper	Joshua-Tree Woodland	Urban Agriculture
*Desert tortoise (Gopherus agassizi)	X				X	
Banded gecko (Coleonyx variegatus)	X		X	X	X	
*Granite night lizard (Xantusia henshawi)	X					
Desert night lizard (Xantusia vigilis)	X			X	X	
Chuckawalla (Sauromalus obesus)	X					
Desert iguana (Dipsosaurus dorsalis)	X				X	
Zebra-tailed lizard (Callisaurus draconoides)	X				X	
Mojave fringe-toed lizard (Uma scoparia)	X					
*Coachella valley fringe-toed lizard (Uma inornata)	X					
Leopard lizard (Crotaphytus wislizenii)	X			X	X	
Collared lizard (Crotaphytus collaris)	X			X	X	
Desert spiny lizard (Sceloporus magister)	X			X	X	
Granite spiny lizard (Sceloporus orcutti)		X	X			
Western fence lizard (Sceloporus occidentalis)		X	X	X		X
Long-tailed brush lizard (Urosaurus graciosus)	X					
Side-blotched lizard (Uta stansburiana)	X	X	X	X	X	X
Desert horned lizard (Phrynosoma platyrhinos)	X				X	
Coast horned lizard (Phrynosoma coronatum)		X	X	X		
*Flat-tailed horned lizard (Phrynosoma mcalli)	X				X	
Gilbert's skink (Eumeces gilberti)		X	X			
Western skink (Eumeces skiltonianus)		X	X			
Western whiptail (Cnemidophorus tigris)	X	X	X	X	X	
Orange-throated whiptail (Cnemidophorus hyperythrus)		X	X			
Southern alligator lizard (Gerrhonotus multicarinatus)		X	X			
Western blind snake (Leptotyphlops humilis)	X	X	X		X	
Rosy boa (Lichanura trivirgata)	X	X	X	X	X	
Ringneck snake (Diadophis punctatus)			X			
Spotted leaf-nosed snake (Phyllorhynchus decurtatus)	X				X	
Striped racer (Masticophis lateralis)		X	X			

Table /

Wildlife Observed or
Expected Along Kaiparowits
Transmission Line

REPTILES	Creosote Bush Scrub	Coastal Sage Scrub	Chaparral	Pinyon-Juniper	Joshua-Tree Woodland	Urban Agriculture
Red racer (Masticophis flagellum)	X	X	X	X	X	
Racer (Coluber constrictor)		X	X			
Western patch-nosed snake (Salvadora hexalepis)	X	X	X		X	
Gopher snake (Pituophis melanoleucus)	X	X	X	X	X	X
Glossy snake (Arizona elegans)	X	X	X		X	
Common kingsnake (Lampropeltis getulus)	X	X	X		X	
Long-nosed snake (Rhinocheilus lecontei)	X	X	X		X	
Western aquatic garter snake (Thamnophis couchi)		X	X			
Western shovel-nosed snake (Chionactis occipitalis)	X				X	
Western black-headed snake (Tantilla planiceps)	X	X	X	X	X	
Night snake (Hypsiglena torquata)	X	X	X	X	X	
California lyre snake (Trimorphodon vandenburghi)	X	X	X		X	
Western rattlesnake (Crotalus viridis)		X	X			
Western diamond back rattlesnake (Crotalus atrox)	X			X	X	
Sidewinder (Crotalus cerastes)	X					
Red diamond rattlesnake (Crotalus ruber)		X	X	X		
Speckled rattlesnake (Crotalus mitchelli)	X		X	X	X	

*Rare or unique species (see text).

(1) Rare and endangered and/or unique species are listed here even though they are not seen frequently.

(2) The list is not intended to be a complete list.

Appendix B

TABLE 2 - Threatened Wildlife Along The Kaiparowits Transmission Lines

Name	Status *
Amphibians:	
California Newt (Taricha torosa)	6
Ensatina (Ensatina eschscholzi)	6
Western Spadefoot Toad (Scaphiopus hammondi)	6
Southwestern Toad (Bufo microscaphus)	6
Red-legged Frog (Rana aurora)	6
Reptiles:	
Desert Tortoise (Gopherus agassizi)	6
Granite Night Lizard (Xantusia henshawi)	6
Mojave Fringe-toed Lizard (Uma scoparia)	6
Coachella Valley Fringe-toed Lizard (Uma inornata)	6
Flat-tailed Horned Lizard (Phrynosoma m'calli)	6
Gilberts Skink (Eumeces gilberti rubricaodatus)	6
Orange-throated Whiptail (Cnemidophorus hyperythrus)	6
Rosy Boa (Liehanura triuirgata)	6
Birds:	
Bald Eagle (Halaieetus leucocephalus)	1, 2
Peregrine Falcon (Falco pereqrinous)	1, 2
Prairie Falcon (Falco mexicanus)	6
Ferruginous Hawk (Buteo regalis)	6
Yellow-billed Cuckoo (Coccyzus americanus occidentalis)	4
Barn Owl (Tyto alba)	3
Loggerhead Shrike (Lanius ludoricianus)	3
Lesser Goldfinch (Spinos psaltria)	3
Mammals:	
Spotted Bat (Euderma maculata)	6
Mountain Lion (Felis concolor)	6
Stevens Kangaroo Rat (Dipodomys stephensi)	4
Bighorn Sheep (Ovis canadensis cremnobates)	4

* Definitions - From "Threatened Species of Riverside District" (Anon 1975)

1. Endangered (FWS): "any species which is in danger of extinction throughout all or a significant part of its range...."
2. Endangered (CDFG): "an animal of a species or subspecies...., the prospects of survival and reproduction of which are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, or disease.

3. Declining: Any species or subspecies which reliable authorities believe, on the basis of factual counts, are diminishing in numbers such that they may in the foreseeable future, become threatened.

4. Rare: (CDFG)..."species or subspecies..., although not presently threatened with extinction, is in such small numbers throughout its range that it may be endangered if its environment worsens."

5. Threatened: (FWS) "means any species which is likely to become endangered species within the foreseeable future throughout all or a significant portion of its range.

6. Status Undetermined: any species or subspecies that is considered by reliable authorities to be endangered, rare, or threatened, for which adequate data as to the status is lacking.

7. Isolated Population: any species or subspecies not in danger of extinction over much of its range but is found in areas isolated from the main population in such manner as to be threatened with local extinction or is of scientific or aesthetic interest.

APPENDIX C - EIS MATERIAL

Submitted For Vegetation, and Wildlife For Proposed Transmission Line

Appendix C - EIS Material Submitted For Vegetation and Wildlife for Proposed Transmission Line

I. Vegetation (Mohave To Serrano)

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E. Unavoidable Adverse Impacts

I. Vegetation (Mohave to Serrano)

A. Existing Environment

(1) Types and Species

The vegetation along the Mojave to Serrano powerline can be divided into two broad zones. The zone east of San Gorgonio Pass is in the rain shadow of the San Gabriel, San Bernardino and San Jacinto Mountain ranges and is classified as desert. This area is quite xeric, receiving 3-10 inches of rain per year. The perennial vegetation is sparse to medium in density. Annuals depend on scattered thundershowers, and may be completely absent in dry years. Trees are restricted to washes and higher elevations on desert mountain ranges. Plant communities found in this zone are:

	Preferred Route	Alternate Route
Creosote Bush Scrub		
. Creosote-Cheese Bush-Burro Bush	X	X
Ocotillo-Palo Verde-Desert Ironwood	X	
Creosote - Atriplex		X
Alkali Sink Scrub	X	X
Joshua Tree Woodland		X
Pinyon-Juniper Woodland		X

East of the pass, rainfall ranges from 12-30 inches per year. The vegetation is medium to heavy in density with annuals providing nearly complete ground cover. Soil is deep in the valleys and good for agriculture.

Plant communities found in this zone are:

	Preferred Route	Alternate Route
Coastal Sage Scrub	X	X
Soft Chaparral	X	X
Chaparral	X	X

Coastal Sage Scrub - Coastal sage scrub is an open shrub community, with shrubs to 5 feet tall but infrequently growing together to form a closed canopy. Open areas are covered by forbs and grasses exposing little bare ground. This plant community is found at elevations below the more dense chaparral. In recent years it has been subject to grazing and is now becoming dominated by introduced grasses and forbs. The amount of coastal sage scrub in Southern California has dwindled in the last fifty years due to the ease with which it can be cleared. Agricultural and urban growth has extended primarily into these areas.

Dominant Species:

California buckwheat	Eriogonum fasciculatum
California sagebrush	Artemisia californica
Black sage	Salvia mellifera
White sage	Salvia apiana
Brittle bush	Encilia farinosa
-	Schismus barbatus
Wild oats	Avena barbata
Brome grass	Bromus sp.
Filaree	Erodium cicutarium
Mustard	Brassica sp.

Chaparral - This plant community is composed of evergreen shrubs 3 to 10 feet high. Vegetation is usually very dense and often difficult to walk through. Only at the edges or in places where the canopy opens and allows light to reach the soil are high densities of forbs and grasses found. Prior to man's fire prevention practices, chaparral was subject to burning every 20 to 40 years. The plants have become adapted to this and if regular burning does not occur succession to Oak Woodland will take place if soil and moisture conditions are proper. Burning is necessary to maintain chaparral in its prime condition. Modern management practices use chaining and clearing methods in place of fire.

Dominant Species:

Chamise	Adenostoma fasciculatum
Manzanita	Arctostaphylos spp.
California Lilac	Ceanothus spp.
Mountain mahogany	Cercocarpus betuloides
Holly-leaf cherry	Prunus ilicifolia
Scrub oak	Quercus dumosa
Poison oak	Rhus diversiloba
Sugar bush	Rhus ovata
Spanish bayonet	Yucca whipplei

Soft Chaparral - Soft or chamise chaparral is intermediate between coastal sage scrub and chaparral, and contains species of plants found in both. Soft chaparral is open in some areas and very dense in others. Fire is an important factor in its ecology as in

chaparral. Chamise chaparral is decreasing in abundance due to the ease with which it can be cleared for agricultural and urban uses.

Dominant Species:

California buckwheat	Eriogonum fasciculatum
Chamise	Adenostoma fasciculatum
Brittle bush	Encelia farinosa
Lemonade berry	Rhus integrifolia
Wild oats	Avena barbata
Sugar bush	Rhus ovata
Mustard	Brassica spp.
Black sage	Salivia mellifera
Spanish bayonet	Yucca whipplei

Creosote Bush Scrub -This plant community covers most of the California Deserts. It is highly variable but several well defined associations exist. Each one will be treated separately here.

Creosote Bush-Cheese Bush-Burro Bush Association - This common association is composed of low growing shrubs 1 to 5 feet tall. Vegetation is normally sparse except in areas where water supply is regular. In these areas, such as Ward Valley, shrubs are large and dense and may resemble chaparral. Moister areas often have large amounts of blackbrush and ground cover is usually good.

Other areas with less water have sparse vegetation and are often composed solely of creosote bush. Along the powerline this condition is found around the Coxcomb and Iron Mountains.

The Dead Mountains and the area between the San Jacinto Mountains

and the Indio Hills is made up of creosote bush, cheese bush and burro bush, but in addition, the dominant plant in these areas is brittle bush. Bothe areas have many large barrel cactus and on the west slope of the Dead Mountains there are large stands of Mojave yucca and jumping cholla.

The Indio Hills to the Cottonwood Mountains area is very sandy and creosote bush is the only plant found in any abundance.

The power line from the Mojave Generating Plant to the base of the San Jacinto Mountains goes through creosote bush scrub. The creosoto bush-cheese bush-burro bush association is the dominant vegetation of the desert and covers 75% of this portion of the power line.

Dominant Species:

Brittle bush	Encelia farinosa
Burro bush	Ambrosia dumosa
Cheese bush	Hymenoclea salsola
Creosote bush	Larrea divaricata
Mormon tea	Ephedra spp.
Barrel cactus	Echinocactus acanthodes
Cholla	Opuntia spp.
Mojave yucca	Yucca schidigera
Black brush	Coleogyne ramosissima
California buckwheat	Eriogonum fasciculatum
Desert trumpet	Eriogonum inflatum

Octotillo-Palo Verde-Desert Ironwood Association

This vegetative type extends along approximately 40 miles of the proposed power line on the south side of Joshua Tree National Monument. This association is uncommon in the deserts and confined to a few well watered areas. Creosote is uncommon here, although the area is classified as creosote bush scrub.

Dominant Species:

Palo verde	Cericidium floridum
Ocotillo	Fouquieria splendens
Cat claw	Acacia greggii
Cholla	Opuntia spp.
Barrel cactus	Echinocactus acanthodes
Mormon tea	Ephedra spp.
Small-leaved hoff-mannseggia	Hoffmanseggia microphylla
Desert ironwood	Olneya tesota

Desert Wash

Along washes and dry stream beds throughout the desert, water supply is regular enough to support a vegetation requiring more water. In some areas the vegetation is sparse and stunted. In others the vegetation is dense with palo verde, smoke tree and desert ironwood trees reaching 10 to 20 feet in height.

Dominant Species:

Palo verde	Cercidium floridum
Smoke tree	Parosela spinosa
Desert ironwood	Olneya tesota
Desert willow	Chilopsis linearis
Cat claw	Acacia greggii

Alkali Sink Scrub - Alkaline sink vegetation is restricted to low spots where water collects and evaporates leaving high concentrations of salts behind. Plants existing there are adapted to alkaline soils. Vegetation is extremely sparse with large amounts of exposed soil.

Dominant Species:

Iodine bush	Allenrolfea occidentalis
Salt bush	Atriplex spp.
Pickleweed	Salicornia spp.
Seep weed	Suaeda spp.

(2) Distribution along power line

Coastal Sage Scrub - This plant community is found from the base of the San Jacinto Mountains, west at lower elevations along the Devers to Serrano portion of the power line.

The power line crosses undisturbed areas of coastal sage scrub at the west end of Lamb Canyon and in the hills east of Alberhill. The San Jacinto Valley east to the boundary of the Cleveland National Forest is predominantly agricultural land with small pockets of undisturbed coastal sage scrub. The vegetative type can also be found in a very narrow strip along the northern base of the San Jacinto Mountains between the creosote bush scrub, agricultural lands and chaparral.

Chaparral - Hard chaparral is found in dense stands along the Cleveland National Forest section of the proposed Devers to Serrano power line.

Soft Chaparral - This vegetative association is found on the Lakeview Mountains and from Lamb Canyon east to the base of the San Jacinto Mountains.

Creosote Bush Scrub

Creosote Bush - Cheese Bush - Burro Bush Association

This vegetative type is found from the Mojave Generating Plant to the west side of the Coxcomb Mountains and from the Cottonwood Mountains west to the base of San Jacinto Mountains.

Ocotillo-Palo Verde-Desert Ironwood Association

This association is found south and east of Joshua Tree National Monument, from Cottonwood Mountains east to near the base of the Coxcomb Mountains.

Desert Wash

This vegetative type is found at scattered locations throughout the desert.

Alkali Sink Scrub - These areas are scattered along the power line. The proposed route crosses Danby and Hayfield Dry Lakes and approaches Cadiz and Bristol Dry Lakes.

(3) Ground Cover

The xeric portions of the route, east of San Gorgonio Pass, are primarily creosote bush scrub and alkali sink scrub plant communities. Forbs and grasses in this region are dependent on thunder showers which vary from year to year and place to place. Even in areas that receive good rainfall, ground cover is poor, often with less than 20% coverage.

West of San Gorgonia Pass along the more mesic portions of the route, ground cover increases. Seasonal rainfall in chaparral and

coastal sage scrub communities is regular, producing heavy ground cover. In many areas forbs and grasses provide 100% coverage.

(4) Composition

The preferred powerline route passes through the following plant communities:

	Percent	Miles
Urban-Agricultural	3	8
Urban-Agricultural with isolated pockets of undisturbed coastal sage scrub	5	13
Coastal Sage Scrub	4	11
Chaparral	7	19
Soft Chaparral	9	24
Creosote Bush Scrub		
Creosote-Cheese Bush-Burro Bush	58	155
Ocotillo-Palo Verde-Ironwood	12	32
Alkali Sink Scrub	2	5
	100%	267

(5) Successional Stages

Coastal sage scrub, alkali sink scrub, and creosote bush scrub are considered climax communities. Urban-agricultural lands are disturbed areas with little native vegetation and many introduced agricultural, ornamental and weed plants. Chaparral is a climax community in areas where soil type and moisture prevents germination of oak trees. In areas with the proper soil type chaparral is called a fire sub-climax community. Periodic fires prevent succession to oak woodland, maintaining the area in chaparral.

(6) Productivity

Productivity east of San Gorgonio Pass is low. Desert rains are erratic producing few forbs and grasses. As a result grazing is confined to a few relatively well watered areas around desert mountain ranges. West of the pass, productivity is high. Irrigation water is available and rains are regular. The lands are often used for agricultural purposes. Coastal sage scrub is relatively open and used for grazing. Chaparral is dense and in most areas cannot be used without clearing.

(7) Relationship to soil type and moisture

Alkali sink scrub vegetation is restricted to alkaline soils. With this exception, desert plant communities are limited by moisture not soil type. Some species do exist which are restricted to specific soil types but these are not dominant desert species and make smaller contributions to the desert ecosystem.

Coastal sage scrub, in areas receiving between 15-25 inches of rain per year, occurs almost entirely on unconsolidated soil material, such as gravel washes, loosely consolidated sediments, talus slopes, and colluvial deposits. In areas where the annual precipitation is less than 15 inches, coastal sage scrub frequently occurs on residual soils. Chaparral is found at elevations above coastal sage scrub in areas with heavier soils and more moisture.

(8) Rare and Endangered Plants

The following plants are considered rare or endangered by the California Native Plant Society and occur in the vicinity of the preferred powerline right-of-way.

Species	Location
Brodiaea filifolia	CH, CSS, Near Perris
Coryphantha vivipara alversonii	CSS, JTW, Little San Bernardino to Eagle and Chuckawalla Mountains.
Hemizonia mohavensis	Ch, San Jacinto Mtns.
Dudleya saxosa aloides	CBS, Ch, PJW. Desert Mtns. of San Bernardino Co., desert slopes San Jacinto Mtns.
Ditaxis adenophora	CBS, Sandy flat below 500 ft. Coachella Valley
Ditaxis californica	CBS, Sandy washes, 400 to 3000 ft., Santa Rosa to Eagle Mtns.
Linanthus arenicola	CBS, JTW. Gypsophilus plant. Mojave desert, Needles.
Chorizanthe leptoceras	CBS, Sandy places Elsinore area.
Ayenia compacta	CBS, Dry rocky canyons, below 1500 ft., w. edge Colorado Desert to Eagle Mountains.

CSS - Coastal Sage Scrub
Ch - Chaparral
CBS - Creosote Bush Scrub
JTW - Joshua Tree Woodland
PJW - Pinyon Juniper Woodland

(9) Unusual Vegetational Associations

(a) Willow Hole - This area is a small wash at the north end of the Indio Hills. The ridges of the wash are covered with cat claw (Acacia greggii) and creosote (Larrea divericata). The wash is densly packed with willow (Salix spp.) 6 to 8 feet in height, with 15 to 20 fan palms (Washingtonia filifera) scattered in clumps along the wash.

(b) Thousand Palms Oasis - This is an unusual area due to the presence of standing water. The vegetation consists of fan palms (Washingtonia filifera), cat claw (Acacia greggii), mesquite (Prosopis spp.), cat-tail (Typha spp.) and other plants associated with standing water. The association is very uncommon in the desert.

(c) Pushawalla Canyon - A spring located here provides water for plants otherwise excluded from the desert. The vegetation is similar to Thousand Palms Oasis (see above).

B. Probable Future Environment Without Kaiparowits Project.

Types of vegetation, species, composition, ground cover and distribution of Southern California plant communities is not expected to change in the future. Man's primary effect upon the native vegetation will be through a slow continual loss of undisturbed vegetation. Clearing of land for agricultural use, road construction, urban growth, off-road vehicle use, construction of the Vidal Nuclear Power Plant and power lines will all cause loss of native habitat. None of these individually have a large impact, but the cumulative effect is great. This slow drain on the environment is expected to have a large long-range negative effect on native vegetation.

C. Environmental Impacts of Proposed Action

Construction and maintenance of the proposed Mojave to Serrano power lines will have four major impacts on vegetation.

(1) Construction of access roads, stub roads to individual towers, and clearings for towers, crane pads and lay-down areas will all result in direct removal of vegetation. Using maps provided by Southern California Edison, it has been estimated approximately 140 miles of new access roads will be constructed. Assuming a road 12 feet wide, this will result in the removal of 203 acres of vegetation. Approximately 1700 towers will be needed to construct two power lines, separated by 130 feet. In areas where new access roads are constructed, a minimum of 130 feet of tower stub roads will be needed for each pair of towers. In areas where existing access roads are utilized, 260 feet of tower stub roads will be necessary to cross the existing lines and reach the new towers. A minimum of 90 acres will be cleared for stub roads. An additional 395 acres will be cleared for crane pads, tower sites, and lay-down areas. A total of 688 acres will be cleared of native vegetation. The break down of losses by plant community is as follows:

	Acres
Urban-Agricultural	20
Urban-Agricultural with isolated pockets of undisturbed coastal sage scrub	36
Coastal Sage Scrub	32
Chaparral*	62
Soft Chaparral	79
Creosote Bush Scrub	
Creosote-Cheese Bush-Buno Bush	337
Ocotillo-Palo Verde Desert Ironwood	72
Alkali Sink Scrub	10
	688

* This figure assumes dense stands of chaparral will not be cleared the entire width of the right-of-way.

The entire route passes through areas where water is limiting. Areas west of San Gorgonio Pass are mesic only in relation to the extremely dry areas east of the pass. Vegetation in dry areas reinvades at very slow rates. This project plus other encroachments by man will result in a slow degradation of remaining undisturbed plant communities in Southern California.

(2) Use of roads and tower sites by construction equipment and regular vehicular travel will cause soil compaction. This combined with increased run off will permanently prevent revegetation of the area.

(3) Construction of new roads into areas without existing roads will increase off-road vehicle use. This permits use in undisturbed areas and promotes future vegetational losses.

(4) Rare and endangered plants may be found at many locations along the right-of-way. Rare and endangered species have small population sizes and removal of a few individuals can significantly affect the entire population. Small encroachments on these species will eventually eliminate them.

D. Mitigating Measures

(1) Statutory and Administrative Requirements

To prevent excessive clearing and facilitate revegetation, the applicant will be required to follow Forest Service guidelines for clearing, landscaping and erosion control in Cleveland National Forest (see Appendix D.)

(2) Applicants Proposed Additional Mitigating Measures

(a) All trees and shrubbery in the vicinity of construction activity which are not specifically required to be cleared or removed during construction will be preserved and protected by steel stakes, wire fence or bright-colored flagging. Trees and brush will be cleared only when necessary to provide electrical clearance, line reliability or suitable access for maintenance and construction.

(b) Vehicular traffic will be limited to approved access roads and construction sites and in no case will any vehicle travel beyond the limits of these areas unless absolutely necessary.

(c) During construction of transmission lines in areas where fire hazard exist, all vehicles and gas-powered equipment will be equipped with spark arresters. A fire patrolman will be on the site with a pumper-equipped pickup truck when necessary. If required, fire-fighting equipment will be located in cache boxes along the right-of-way at strategic locations.

All welding, grinding operations, and smoking privileges will be controlled in fire-danger areas.

When weather conditions create an extreme fire danger, construction operations will be either limited or curtailed as required by regulatory agencies. The construction engineer or general foreman will establish a project fire plan and all project personnel will be instructed as to their individual responsibilities in implementing the plan.

(d) Parking areas will be arranged so as to minimize the amount of clearing necessary to accommodate the required parking needs.

(e) While constructing temporary access roads, consideration will be given to the restoration required after completion of construction, which will include reseeding, rock cover, etc. Clearing or grading will be minimized.

(f) Metal downdrains will be provided where needed. If the water flow cannot be spread into a vegetated area, dissipaters will be installed.

(g) Access roads will follow the natural contour of the land where possible, thereby minimizing permanent scarring of the area. The visual impact of the access roads on the immediate and surrounding areas will be considered at all times during construction.

Upon completion of construction, all access roads shall be restored to conditions acceptable to private property owners and regulatory agencies. This will include removal of surplus buildings and equipment, lumber, refuse, fencing or any other items not at the site prior to construction. Any drainage deficiencies will be corrected to prevent future erosion, and cut and fill areas will be restored approximately to their pre-construction condition.

Revegetation of specific areas that may be required by regulatory agencies will also be performed.

(h) Where required and approved by the agency controlling the area, brush, timber and other wood products will be disposed of either by chipping or shredding, and dispersed to serve as mulch, rather than burned. Machine clearing will be avoided to the fullest extent possible near streams.

(i) Concrete will be hauled to the structure site from local concrete mixing plants in standard concrete trucks. Care will be taken so that vehicles will not eradicate or damage the existing landscape and natural vegetation. Disposal of unused concrete will be restricted to areas so designated for this purpose.

(j) During assembly, care will be taken to minimize damage to trees or shrubs at the construction sites.

(k) After complete erection, the site will be returned as nearly as possible to its natural terrain and erosion control methods will be taken immediately following construction.

(l) Set-up locations for stringing equipment will be planned in conjunction with the layout of the access roads. Where possible, the main access road will be routed adjacent to the set-up areas to minimize the need for additional clearing for stub roads.

(m) Conservation measures will be implemented as soon as practical in the set-up areas after removal of equipment. During pulling and sagging operations over vegetated areas, the sag of the conductor will be maintained at a height necessary to minimize damage to vegetation.

(n) Cuts and fills for crane operating pads will be the minimum required and consistent with safe operating practices.

(o) The applicant does not anticipate using herbicides, pesticides, or defoliants on the rights-of-way of the proposed transmission system because the type of terrain traversed contains very little dense growth of foliage that would adversely impair operations.

(p) All right-of-way clearing and tree trimming operations will be in conformance with local regulations.

(q) Trees will be trimmed only to the extent required to maintain line reliability. In mountainous areas, clearing and tree trimming will be performed on a selective basis to reduce fire hazard and maintain the surroundings as near to their original state as possible.

(r) Where feasible, all cut or fill slopes will be kept vegetated with a suitable species of ground cover to prevent future erosion.

(s) Material from earth slides and other sources requiring removal from the road will neither be deposited in streams or stream channels nor sidecast onto vegetated slopes or other locations where it will erode or wash into streams and cause damage through silting of streams and reservoirs.

(t) During the course of maintaining transmission lines and patrol roads, all personnel will make every effort to become aware of and protect all species of plant and wildlife, and all resources of historical and archaeological value.

(3) Mitigating Measures Definitely Proposed by Other Organizations

(a) Observations of recently installed 500kv powerlines near Cajon Pass indicate large areas were cleared for crane pads and laydown areas. Nearby lines installed two years before showed no evidence of vegetation removal for these purposes. Desert vegetation will not regenerate in this short period. It is obvious, these areas were not cleared during construction of the older lines. This indicates techniques for tower set-up are available which do not require clearing

large areas. These methods should be used. If crane pads and lay-down areas are not cleared, the total amount of vegetation removed can be reduced by over 55%. This would be a significant reduction in the impact of the powerline on native vegetation.

(b) The three areas designated as unusual vegetational associations are considered as such due to the presence of water on or near the surface and its influence on the local vegetation. All three of these areas are located on the north side of the Indio Hills and will either be crossed by the line or have it approach within one quarter of a mile. Rerouting the powerline south of the Indio Hills would remove this impact, leave the vegetation intact and prevent further disturbances caused by increased accessability.

(c) To prevent un-necessary damage to lands adjoining the right-of-way, all grading, cutting and filling, clearing and dumping should be confined to areas within the right-of-way designated by local Forest Service, Bureau of Land Management and County officials.

(d) In areas of dense chaparral and coastal sage scrub, clearing will be confined to necessary roads and pads. Under no circumstances should the entire right-of-way be cleared.

E. Unavoidable Adverse Impacts

A minimum of three hundred acres will be cleared for access and stub roads. This will result in complete removal of natural vegetation. Use of these roads will result in soil compaction, increasing run-off in already dry areas and preventing reinvasion by native plants. Clearing will remove individuals of rare and endangered plant species, further reducing their small population size. New roads will increase accessability of undisturbed areas and promote additional losses due to off road vehicle use.

II. Wildlife (Mohave to Serrano)

A. Existing Environment

(1) Big Game

Two species of big game exist in the vicinity of the proposed transmission line, Nelson's bighorn sheep and southern mule deer. (Scientific names of all species discussed in the text are given in Appendix B). Bighorn sheep are found in the mountains surrounding the transmission route. Mountain ranges with resident sheep populations include the Old Woman, Piute, Sacramento, San Bernardino and Turtle Mountains in San Bernardino County, and the Little San Bernardino, Eagle, Coxcomb, Chuckwalla, Granite, Palen, Orocopia and San Jacinto Mountains in Riverside County (Weaver 1972). The proposed transmission line crosses the Coxcomb Mountains and skirts the northern edge of the San Jacintos.

Mule deer are found in the Santa Ana Mountains of Orange and Riverside Counties, the San Bernardino Mountains of San Bernardino County, and the San Jacinto and Little San Bernardino Mountains of Riverside County. The proposed transmission line crosses the Santa Ana Mountains and skirts the edge of the San Jacintos.

(2) Upland Game

Upland game along the transmission route include black-tailed jackrabbit, desert cottontail, brush rabbit, band-tailed pigeon, mourning dove, white-winged dove, gambel's quail, California quail, mountain quail, and chukar partridge.

Black-tailed jackrabbit and desert cottontails are found along the entire length of the transmission line where suitable brush cover and succulent vegetation exists. Brush rabbits are found in chaparral habitat in the section from Devers to Serrano.

Band-tailed pigeons are found in winter in large flocks in the Santa Ana Mountains. Mourning doves are found year round along the entire length of the line.

White-wing doves are found along a short section of the transmission line in the vicinity of the Coxcomb Mountains. This is at the northwestern most edge of their distribution and they are not found along the rest of the line.

The remaining upland game birds are non-migratory and are found locally along the transmission line in the vicinity of permanent water sources. Mountain quail and California quail are found in the Santa Ana Mountains where the line crosses. Mountain quail are found in Joshua Tree National Monument but probably do not range as far south as the transmission line. Gambel's quail are found in the vicinity of desert water sources from Devers eastward. Chukar partridge have been introduced into many of the mountain ranges in eastern Riverside and southeastern San Bernardino Counties in the vicinity of the proposed power line including the Chuckwalla, Eagle, Coxcomb, Iron, Old Woman, Piute, Stepladder and Sacramento Mountains. Most of these transplants have not been successful except in the northern Piutes although unconfirmed reports of chukars in these areas are occasionally received.

(3) Waterfowl

There are no major waterfowl concentration areas along the transmission route. Some waterfowl are found in the vicinity of the line in

water impoundments and reservoirs. One such area that has ponds capable of attracting waterfowl is the Thousand Palms Oasis near Devers which is less than 1/4 mile from the proposed transmission line route.

(4) Non-game species

A variety of non-game species of birds and mammals exist along the transmission route. These are listed by vegetation type in Appendix B.

Aside from those animals covered in other sections due to their economic, esthetic or scientific value, there is no reason to single out certain species for discussion. It should be noted, however, that some species such as the desert night lizard are restricted to one vegetation type, in this case Joshua Tree Woodland, whereas others such as the coyote are quite cosmopolitan, occurring in several vegetation types. Those species that are the most restricted in their habitat requirements are the ones most likely to be harmed by human activities such as power line construction.

Along the eastern section of the proposed transmission line, from approximately Devers to Mohave, the distribution of animals within the type is dependent on the distribution of water. Although some of the smaller mammals such as jackrabbits and kangaroo rats can survive without free water, the larger mammals and birds cannot and are not found far from permanent water. Long stretches of land along the eastern section of the route do not have permanent water and therefore support a low diversity of animal species. On the other hand, those areas where surface water is available support a great diversity of species.

(5) Threatened and/or unique species

Endangered, threatened, and/or rare species of mammals and birds are listed in Table 1. Also listed in this table are species that are uncommon and whose status is undetermined. The habitat in which all these species can be found is listed in Appendix E.

In general, the species that are limited in numbers and distribution have very specific habitat requirements and survive only in very localized situations with suitable vegetation and topography.

In addition, these species may be quite sensitive to human disturbance. Therefore, they are usually associated with unique vegetation and/or topography as described in the previous section.

For example, bighorn sheep require rugged mountainous terrain for escape cover with adequate grass and forbs and year-round water supplies to meet their food and water requirements. In addition, they are quite sensitive to human disturbance (Dunaway 1971).

Mammals. - The spotted bat is rare within its entire range, and the U. S. Fish and Wildlife Service (1968) states that it is among America's rarest mammals. This bat has been reported from Mecca, south of the proposed power line route. The pocketed free-trail bat is occasionally found along the proposed transmission line and has been reported near the Devers area.

The desert kit fox is found in low numbers in the desert areas from Devers to Serrano. The California mountain lion is found in low numbers in suitable areas with adequate deer populations and low human population density from Devers to Serrano, particularly where the proposed line cuts across the Cleveland National Forest.

Stephens kangaroo rat is found in the San Jacinto Valley where the line crosses and has been identified by the California Department of Fish and Game (1974) as a rare species. Urbanization and land use change have destroyed most of its original habitat, and it is found now in only 15 isolated localities in Riverside County and one in San Diego County.

Bighorn sheep distribution has been described in the big game section. Of the two sub-species listed in Appendix E, only the peninsular bighorn sheep was considered to be rare by the U. S. Fish and Wildlife Service (1968). This sub-species intergrades with Nelson's bighorn sheep in the San Gorgonio Pass area. The line crosses the northeastern edge of range used seasonally by these sheep. Nelson's bighorn sheep is found in most of the desert ranges to the east of San Gorgonio Pass. Although it is not considered a rare or endangered sub-species it is not abundant and is declining over most of it's range.

Birds - Several species of rare and endangered and/or unique raptors are found along the proposed transmission line.

The ferruginous hawk was formerly a common winter resident in the area crossed by the Serrano to Devers section of the proposed line, but is now uncommon in this area. The U. S. Fish and Wildlife Service considered this species to be of undetermined status in 1968. Similarly, the red shouldered hawk once was common in the western half of Riverside County from approximately Devers to Serrano but is now rare and has been identified as of undetermined status (U. S. Fish and Wildlife Service, 1968). A third species of raptor, the prairie falcon, is found in low

numbers along the entire proposed transmission line route. It was identified as a rare species by the U. S. Fish and Wildlife Service in 1968.

Two species of raptors that have been identified as endangered, the southern bald eagle and the American peregrine falcon, are found along the route. The southern bald eagle has been reported from the San Jacinto Valley. The American peregrine falcon is occasionally seen in the section from Serrano to Devers and in the vicinity of the Colorado River near Mohave. There are no known nesting sites of any of these raptors within a mile of the proposed transmission line route.

The mountain plover is found in low numbers from Serrano to Indio as is the California yellow billed cuckoo. The mountain plover has been identified by the U. S. Fish and Wildlife Service (1968) as of status undetermined, while the cuckoo has been classified as rare by the California Department of Fish and Game (1974).

Threatened and unique species of reptiles are discussed in the section on reptiles. There are not any threatened or unique acquatic species along the proposed transmission line route.

(6) Invertebrates and micro-organisms

A diversity of invertebrates and micro-organisms exist along the transmission line route. The greatest diversity of invertebrates will be found in the oases and areas of unique vegetation as described in the previous section on vegetation.

(7) Reptiles

A great diversity of reptiles are found along the proposed transmission line route. They are listed by habitat type in Appendix B. Several species are uncommon enough to deserve special mention.

The desert tortoise is found from approximately Devers to Mohave. This species has been reduced in numbers through both shooting and collecting of them for pets. They are now fully protected by California law.

The flat-tailed horned lizard is restricted to areas with sparse vegetation and fine sand and is found along the proposed transmission route in the vicinity of Indio. This species has become more rare in recent years. The Coachella Valley fringe-toed lizard is found in similar habitat in the same general area, and likewise has become rare in recent years. The decline of both species has been attributed in part to habitat destruction by development and by off-road vehicles.

The granite night lizard is found in the San Gorgonio Pass area. It has declined in recent years due to habitat destruction and to over-exploitation by collectors.

(8) Acquatic species

The proposed powerline route does not directly cross any permanent rivers or ponds, therefore virtually no fish are found along the route.

No species of rare and endangered fishes or amphibians are found along the proposed transmission line route.

B. Probable Future Environment Without Kaiparowits Project

Certain wildlife species may be expected to continue to decline without the Kaiparowits Project. These include bighorn sheep (declining due to habitat loss and human disturbance), some of the raptors (declining due to habitat loss, human disturbance, and the effects of pesticides), and the desert tortoise (declining due to disturbance and over-exploitation).

In addition, many species not now recognized as declining will no doubt decline in the future due to the effects of man's activities. Because of this, the cumulative effect of the disturbance caused by the proposed powerline is all the more critical.

C. Environmental Impacts of Proposed Action

(1) Big Game

The major impact on big game will be the increased disturbance to bighorn sheep in the Coxcomb Mountains caused by the contruction of the powerline and access road.

The construction would presumably be a short term impact. However, a road through the Coxcombs would provide good access to an area that is presently without roads. Given the heavy recreational use at the California desert, new roads generally result in increased human activity and disturbance. Human disturbance has been indentified as a factor limiting bighorn sheep populations (Dunaway, 1971). Therefore the proposed powerline can be expected to have a detrimental effect on the bighorn sheep population at the Coxcomb Mountains. Along the remainder at the route the proposed powerline route follows the valleys and does not cut directly across bighorn sheep range. In these areas the impact on sheep would be quite minimal.

The impact at the line on deer populations along the route would be minimal. Some deer browse would be destroyed from clearing where the line crosses the Santa Ana Mountains.

(2., 3.) Upland Game and Waterfowl

The proposed powerline would have a negligible effect on upland game and waterfowl except where it crosses near areas with surface water, namely Willow Hole, Pushwalla Canyon, and Thousand Palms Canyon.

In these areas of animal concentration, the loss of vegetation for food and cover and the death of birds from hitting powerlines and powerpoles would cause some losses of upland game and waterfowl.

(4) Non-game Species and Raptors

For most of the non-game species and raptors, the impacts will be the same as for the upland game and waterfowl species. The affects on the endangered raptors will be described in the following section.

(5) Threatened and/or Unique Species

The rare and endangered mammals and non-raptorial birds will be affected in much the same way as upland game, waterfowl, and non-game species i. e. there will be some losses from habitat destruction and from collisions with powerlines and powerpoles.

The raptorial species, particularly the eagles, can be expected to suffer additional losses from electrocution on the powerlines. The annual losses of raptors due to electrocution is substantial (Crawford and Dunkeson 1973; Hannum et al 1974).

(6) Invertebrates and Micro-Organisms

High numbers of invertebrates and micro-organisms would be destroyed by clearing and construction of the powerline. In addition, clearing of vegetation would remove food and cover utilized by these species. However, because most of these species are widely distributed and numerically abundant, and have high reproductive rates, the overall impact of the powerline on them would be minimal.

(7) Reptiles

Many reptiles can be expected to be destroyed by construction of the powerline, due to direct injury by construction equipment and by

destruction of burrows and other types of cover. These losses may be significant in the case of those species that are already rare, such as the flat-tailed horned lizard, the granite night lizard, and the Coachella Valley fringe-toed lizard.

In addition, the powerline construction would cause some losses of desert tortoises from construction equipment and from the destruction of dens and burrows. Collection or wanton destruction by powerline workers could cause additional losses.

(8) Aquatic Species

As the proposed powerline does not directly cross any streams or other aquatic areas, the impact of the powerline on aquatic species will be negligible.

D. Mitigating Measures

All construction work must be done in compliance with the California and Nevada Fish and Game Code. The desert tortoise is a fully protected species under provisions of the California Fish and Game Code. Therefore, all work on construction and maintenance at the powerline should be done in such a matter that none of these animals are destroyed.

The applicant has proposed no measures to mitigate the effects of the powerline on wildlife.

The disturbance to bighorn sheep caused by constructing a powerline and road through the Coxcomb Mountains could be mitigated in a number of different ways. The powerline could be routed to the south of the Coxcomb Mountains and avoid the bighorn sheep range altogether. A less desirable alternative would be to construct the line through the Coxcomb Mountains without building new road. This could be done by utilizing helicopters

for construction and maintenance. The disturbance would thus be temporary in nature. The detrimental effects on sheep could be further minimized by the construction of a big game guzzler in the south Coxcomb Mountains. This should be done in cooperation with, and under the supervision of the California Department of Fish and Game and the U. S. Bureau of Land Management. By providing water for the sheep and thus making it more attractive range, such construction would lessen the probability that sheep would abandon the range due to temporary human disturbance from construction and maintenance if a powerline.

The effect on wildlife in general, including many species of upland game and raptors plus many non-game and threatened species, could be mitigated in two ways.

First of all, the powerline route could be moved south of the Indio Hills to avoid areas of unique vegetation which support a high diversity of wildlife. Moving the line south of the Indio Hills would prevent the line from crossing or coming near Willow Hole, Pushwalla Canyon, and Thousand Palms Canyon.

Secondly, all construction and maintenance activity should be restricted to the powerline right-of-way.

The effect on birds, particularly raptors, should be mitigated by proper design of power poles to minimize electrocution losses. Powerline standards to reduce raptor losses have been developed by Crawford and Dunkeson (1971) and these standards, as listed in Appendix_ , should be strictly followed.

The impact of powerline construction on the desert tortoise could be mitigated by having a biolgist check all power pole sites prior to construction to make sure that poles will not be placed on tortoise dens. Pole sites that are within 50 feet of dens should be relocated. Furthermore, construction crews should be informed that the tortoise is a fully protected species, and should be supervised to insure that no illegal killing or collecting of tortoises occurs.

E. Unavoidable Adverse Impacts

(1) Big Game

The important adverse affects on big game can be mitigated by the measures described in

(2, 3, 4 & 5) Upland Game; Waterfowl; Non-game Species and Raptors; Threatened and/or Unique Species.

Losses due to birds hitting powerlines and powerpoles are unavoidable adverse impacts.

(6) Invertebrates and Micro-Organisms

The adverse impacts on invertebrates and micro-organisms, although of minimal impact, cannot be mitigated.

(7) Reptiles

Loss of many reptile species, including some threatened and unique species cannot be avoided. A certain loss of desert tortoises, both accidental and deliberate, will probably also result from powerline construction.

(8) Aquatic Species

No impacts on aquatic species have been identified.

APPENDIX D

Forest Service Guidelines

For Clearing, Landscaping and Erosion Control

In Cleveland National Forest

APPENDIX D

Forest Service Guidelines for Clearing in Cleveland National Forest

A. Clearing activities shall be limited to those areas required for construction. Any activity outside the clearing limits must be with the written approval of the District Ranger.

B. Soil, vegetative cover, and esthetic values on the right-of-way and on adjacent lands of the United States shall be protected and preserved so far as practical and consistent with construction operations.

C. Vegetative material resulting from construction activities may be disposed of by any of the following measures:

1. Piled and burned within the right-of-way clearing limits and in conformity with the approved Fire Plan.

2. Chipped where the chips will not interfere with revegetation projects.

3. Buried in areas approved by the Forest Service.

a. Brush and debris shall be placed in layers and compacted to a depth not greater than three feet and then covered with three feet of compacted soil.

b. Tree stumps shall be placed in a single layer and covered with at least three feet of compacted earth fill.

c. The areas where material has been buried shall be shaped to conform with natural ground configuration, shall have adequate surface drainage, be mulched, and vegetation established.

D. Whenever "top soil" with high organic content is encountered, it will be stockpiled and used as the surface layer on waste disposal areas and other areas as designated by the Forest Service.

APPENDIX D

Forest Service Guidelines for Landscaping and Erosion Control in Cleveland National Forest

LANDSCAPING

A. Temporary roads will be obliterated immediately after they have served their intended purpose unless otherwise requested by the Forest Service. Obliteration shall include performance of the following work standards satisfactory to the Forest Service:

1. Removal of all debris and fill material and all culverts from natural drainage courses.
2. Grading of all natural drainage crossings to natural slope and contour.
3. Ground line will be returned to near natural grade as possible by pulling the outside edge of road in against the cut bank where sections in cut are involved; a high berm will be constructed where necessary to prevent vehicle travel.
4. Re-establish vegetation.

B. The Main Divide Road is proposed as a future scenic highway. Therefore, all vegetative and soil disturbance shall be held to a minimum. As soon as need for vegetation and soil disturbance has ceased, the Crest area will be restored to near natural condition, and vegetation re-established.

EROSION CONTROL

A. Where protruding ridges are diagonal across fill slopes, either the ridge shall be removed or a drainage structure provided to carry water to a natural drainage.

B. Where material is excavated for culvert installations, such loose material

EROSION CONTROL

B. Cont'd

shall not be placed below the culvert outlet.

C. Outlets of all culverts shall be properly aligned with the natural stream course and energy dissipators be supplied and installed to minimize drainage course disturbance.

D. Overside drains shall direct the water into natural drainage courses.

E. Temporary roads will not be used during and/or immediately after a rain storm unless absolutely necessary.

F. The repair of all erosion damage will be accomplished as soon as it occurs to prevent further loss of material into the existing drainages.

G. All temporary roads and other areas of soil disturbance shall be contoured, strawed, fertilized, and vegetation reestablished.

H. Fill slopes shall be stabilized by mulching fertilizing, rolling, and establishing vegetation.

The Stabilization of "bare" soil shall be in accordance with the following specifications:

1. Preparing Site

   a. Excavation slopes shall be thoroughly cultivated to a depth of approximately six inches, as designated by the Forest Service.

   b. Any damage by erosion after the completion of site preparation and before the application of seed and fertilizer shall be repaired.

2. Mulching

   a. The area shall be uniformly covered with rice straw, spread at a rate of four tons per acre, when the slopes are in a loose cultivated condition.

2. Mulching (Cont'd)

b. The spread straw shall be impacted into the soil with a roller. (The roller shall be of such design that it will work the straw into the soil sufficiently so that the straw will not support combustion.)

3. Seeding and Fertilizing

a. Fertilizer shall have a guaranteed analysis of 14 per cent nitrogen, 14 per cent available phosphoric acid, and 7 per cent water soluble potash, and spread at a rate of 500 pounds per acre.

b. Seed shall be well mixed and consist of a mixture as follows, or as modified by the Forest Service:

Seed Name	Per-Cent by Weight
Soft Chess (Bromus mollis)	20.0
Italian Rye (Lolium multiflorum or L. wimmera)	60.0
Pubescent Wheatgrass (Topar) (Agropyron trichophorum)	20.0
TOTAL	100.0

c. Seeds shall be uniformly spread over the erosion control area at the rate of 30 lbs. per acre. Inert filler material, approved by the Forest Service, may be used to facilitate spreading the seed.

4. The sequence of the stabilization operation shall be to prepare the site, spread the straw, apply the seed and fertilizer, then impact. There shall be no lapse between mulching, seeding, and fertilizing.

5. Areas of completed construction that are to be stabilized shall be mulched, seeded and fertilized prior to October 15. Between October 15 and April 1 areas to be stabilized shall be stabilized concurrently with

4. Cont'd

the completion of construction.

I. In the event HYDRO-SEEDING (spray-mulching) appears to be more applicable to this project this may be substituted for the mulching-seeding technique above, as mutually agreed to by both parties.

J. Cut slopes shall be stabilized.

APPENDIX F

Powerline Standards

For Reducing Raptor Losses

APPENDIX F

Power line Standards to Reduce Raptor Losses

The following standards for power line construction, from Crawford and Dunkeson (1973) should be followed.

Poles With No Transformers

1. Install lines underground when feasible.
2. A phase or neutral conductor may be mounted at the pole top position. When used, crossarms shall be installed as to provide a minimum of 30 inches vertical separation between crossarm mounted conductors and pole top conductors.
3. For crossarm construction no two wires, on the horizontal plane, will be closer than six feet.
4. Where the neutral conductor is placed below the crossarm at least 24 inches vertical separation shall be provided.
5. Wooden or non-conducting crossarm braces will be used on all poles with crossarms.
6. Any pole ground wire will have two, 4-inch gaps along its length and end at least two inches below the top of the pole.
7. Phase wires will be attached to the crossarm with suspension type insulators.
8. Where crossarms are not used there will be at least 30 inches between the highest conductor and the pole top, and at least 24 inches vertical separation between all lines.

Poles With Transformers

1. A phase or neutral conductor may be installed at the pole top position. When used, crossarms shall be installed to provide a minimum of 30

Poles With Transformers

1. Cont'd

   inches vertical separation between conductors mounted on the crossarm and the pole top conductor.

2. For crossarm construction, no two wires, on the horizontal plane, will be closer than six feet.

3. Wooden or non-conducting crossarm braces will be used on all poles with crossarms.

4. Where crossarms are used, wires will be attached with suspension type insulators.

5. If crossarms are not used the highest phase conductor will be at least 30 inches below the top of the pole. There will be at least 24 inches vertical separation between all lines.

6. The transformer will be installed with bird guards to cover transformer terminals and insulated jumpers.

7. The transformer will be at least 24 inches below the nearest phase wire.

8. Any pole ground wire shall not be extended higher than necessary to ground lightning arrestors and transformer tanks.

9. Along specified secondary roads non-hazardous devices will be installed on pole tops, crossarms, and transformers to eliminate perches for large birds. This will minimize the likelihood of the birds being shot.

10. Install submersible or pad mounted transformers when feasible.

APPENDIX G

Southern California Edison Company EIS

Material on Vegetation and Wildlife

Southern California Edison Company

P. O. BOX 800
2244 WALNUT GROVE AVENUE
ROSEMEAD, CALIFORNIA 91770

August 7, 1974

ARIZONA STATE OFFICE
BU. LAND MANAGEMENT
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SEE ME

Mr. Frank Snell
U. S. Bureau of Land Management
P.O. Box 11505
Salt Lake City, Utah 84111

✓Mr. Michael Johnson
U. S. Bureau of Land Management
3008 Federal Building
Phoenix, Arizona 85025

Gentlemen:

Subject: Kaiparowits Transmission System
Environmental Report

Attached is a draft section for the following sections of the subject EIS.

II. DESCRIPTION OF EXISTING ENVIRONMENT
- G. Vegetation
  - 3. Transmission
- H. Wildlife
  - 3. Transmission

III. ENVIRONMENTAL IMPACT OF PROPOSED ACTION
- G. Vegetation
  - 3. Transmission
- H. Wildlife
  - 3. Transmission

As the information is developed, we will be submitting supplements to you under section II.G.3. covering statistics of plant communities. We will also cover in this supplement, a description of the vegetative communities on the Mohave to Devers to Serrano portion of the transmission line.

We have retained our consultant, Woodward-Envicon, to monitor the biologically sensitive areas along the proposed transmission lines and, as this information is developed, we will submit to you on approximately three-month basis the monitoring information that is developed.

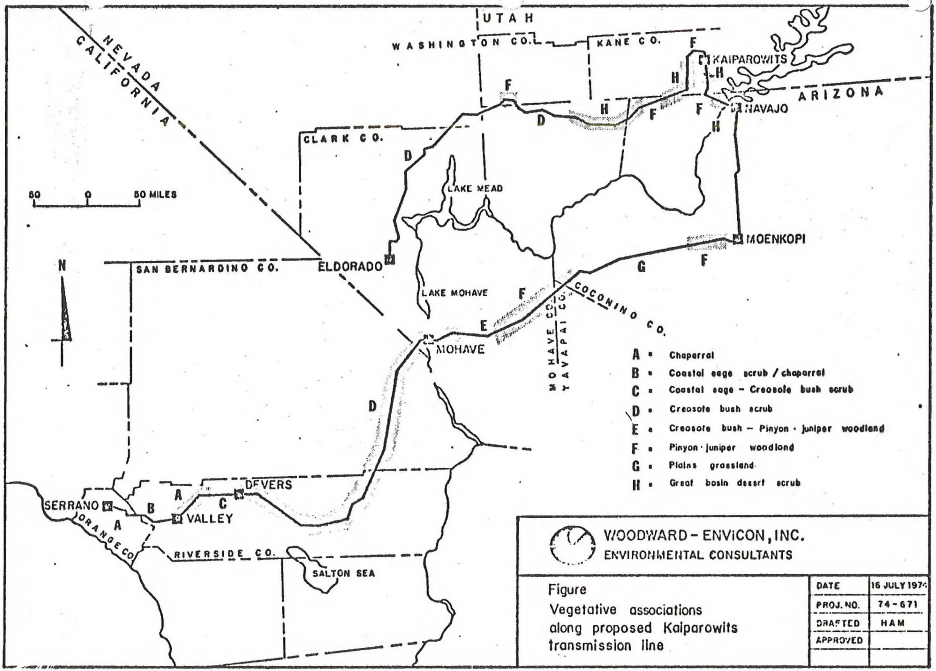
Should you have any additional questions concerning the biology portions of this report, please contact Mr. D. W. Stevens at 213-572-2840.

Sincerely,

C.H. Gunn

C. H. Gunn
Transmission Project
Administrator

MRSM:wc
Attachments



WOODWARD - ENVICON, INC.
ENVIRONMENTAL CONSULTANTS

Figure
Vegetative associations
along proposed Kaiparowits
transmission line

DATE	16 JULY 1974
PROJ. NO.	74-671
DRAFTED	HAM
APPROVED	

COMMUNITIES AND DOMINANT SPECIES

IIG3a1 Mohave to Moenkopi

The proposed Mohave-Moenkopi section of the Kaiparowits transmission line traverses several major habitats in northern Arizona. These include Mohave Desert Scrub, Pinyon-Juniper Woodland, Plains Grassland, and Great Basin Desert Scrub (Lowe and Brown, 1973).

The route between Mohave substation at Bullhead City and Kingman, Arizona is on the eastern limits of the Mohave Desert Scrub vegetative community. Therefore, creosote bush (Larrea divaricata) and burrobush (Ambrosia dumosa) are dominant between the Black Mountains and the Colorado River. From the Black Mountains east to Kingman is a transition zone between the Mohave Desert Scrub of the lower elevations to the west and the Pinyon-Juniper Woodland of the higher elevations to the east. The Black Mountains in this transition zone contain such plants as creosote bush (Larrea divaricata), catclaw (Acacia gregii) and desert willow (Chilopsis linearis) from the desert aspect as well as shrub live oak (Quercus turbinella), juniper (Juniperus osteosperma), and buckbrush (Ceanothus greqii) from the woodland aspect. In the Sacramento Valley east of the Black Mountains a nearly pure stand of creosote bush exists. Burrobush, however, is no longer a co-dominant. The area south of Kingman is a major transition zone with creosote bush, snakeweed, crucifixion-thorn, and some junipers present.

The transmission line corridor between Kingman and Gray Mountain is Pinyon-Juniper Woodland and Plains Grassland vegetative associations. These two associations are abundant in northern Arizona with Plains Grassland prominent in areas void of juniper (Juniperus osteosperma) and pinyon pine (Pinus edulis). Dominant plants in the Pinyon-Juniper Woodland are juniper (Juniperus osteosperma, J. monosperma) snakeweed (Gutierrezia sp.), four winged saltbush (Atriplex canescens) and blue grama grass (Boutelous gracilis). Other plants present but

seldom dominant include cliff rose (Cowania mexicana), apache plume (Fallugia paradoxa) and winterfat (Eurotia lanata). This vegetative community is common on the plateaus and higher elevations in the area.

In the lower elevations and the open areas of the plateaus the Plains Grassland is the common vegetative community. This is a short grass prairie dominated by blue grama (B. gracilis) with some scattered shrubs such as saltbush (A. canescens) and snakeweed (Gutierrezia sp.). Some areas of this grassland also contain such grasses as black grama (B. eriopoda), threeawn (Aristida sp.) and squirreltail (Sitanion hystrix). These grasses are not nearly as abundant as blue grama which in most areas is the most important plant cover.

From the area near Gray Mountain and the Little Colorado River to the Moenkopi substation the transmission line route crosses the southeastern portion of the Great Basin Desert Scrub vegetative type. Soil type in this association is a major factor in determining which shrubs are present and dominant. Dominant shrubs in this area include saltbush (A. canescens), basin sagebrush (Artemisia tridentata), and Mormon-tea (Ephedra sp.). Space between shrubs consists mainly of sand although some galleta grass (Hilaria jamesii) and indian rice grass (Oryzopsis hymenoides) are present. These grasses rarely form a major ground cover.

Kaiparowits to El Dorado

The proposed transmission line corridor crosses several vegetative communities, three major rivers, and a marsh between the proposed Kaiparowits plant site and the El Dorado substation south of Las Vegas. From the Kaiparowitx plant site to approximately the Utah-Arizona border east of Fredonia is a series of high, rugged plateaus that protrude above the valley floor. Vegetation on the tops of these plateaus consists of Pinyon-Juniper Woodland. Vegetation in

this woodland consists almost entirely of trees and shrubs; grasses and annual herbs are not abundant. Dominant plants are Utah juniper (Juniperus osteosperma), pinyon pine (Pinus edulis), sagebrush (Artemisia tridentata), roundleaf buffaloberry (Shepherdia rotundifolia), prickley pear (Opuntia polyacantha) and Mormon tea (Ephedra sp.). Blackbrush (Coleogyne ramosissima) is also present in patches in some of the lower elevations of juniper woodland.

Below the plateaus are Great Basin Desert Scrub vegetative communities. Dominant shrub species vary with the local soil type. Vegetation varies from nearly pure stands of shadscale (Atriplex confertifolia) in alkaline areas to Mormon tea (Ephedra sp.), snakeweed (Gutierrezia sp.) and various species of cactus (Opuntia polyacantha, Echinocereus sp.). Grasses common in these sandy areas are galleta (Hilaria jamesii) and indian ricegrass (Oryzopsis hymenoides).

The proposed transmission line will cross the Paria River south of Cottonwood Canyon. The river at the proposed crossing normally has very little water running in it and is easily crossed by foot. It has the appearance of a large, wide wash with a narrow stream channel that occasionally greatly increases in volume during heavy runoff. Vegetation in the dry aspect of the wash consists mainly of the invading tamarisk (Tamarix pentandra) and rabbitbrush (Chrysothamnus nauseosus). There are also a few widely scattered cottonwood trees (Populus fremontii) in the floodplain.

From near Fredonia to the Hurricane Cliffs the corridor crosses extreme northern Arizona in what is known as the "Arizona Strip". This stretch of land lies between the north rim of the Grand Canyon and the red rock hills of southern Utah. The Arizona strip consists of a mixture of Plains Grassland and Great Basin Desert Scrub. Some areas near Fredonia are nearly pure stands of sagebrush (Artemisia tridentata). To the west the habitat becomes more of a

grassland-shrub association. Such grasses as galleta (Hilaria jamesii), indian rice grass (Oryzopsis hymenoides) blue grama (Boutelous gracilis) and threeawn (Aristida sp.) are in association with snakeweed (Gutierrezia sp.) and in some areas sagebrush (A. tridentata, A. filifolia) and saltbush (Atriplex canescens). Major annual vegetation found in this association are Russian thistle (Salsola kali), peppergrass (Lepidium sp.) and locoweed (Astragalus sp.). This vast grassland-shrub association extends westward to the Hurricane Cliffs. Near the tops of these cliffs are dense stands of blackbrush (Coleogyne ramosissima). The Hurrican Cliffs drop over a thousand feet and act as a natural barrier between the grassland-shrub associations to the east and the creosote bush habitat from the base of the cliffs to the west. Creosote bush is abundant at the base of the cliffs but absent from the top of the cliffs. Blackbrush is present both on top and at the bottom of the cliffs. Blackbrush on the bottom of the cliffs is not widespread and away from the cliffs it is found only on the higher hills.

From the Hurricane Cliffs to the Beaver Dam Mountains the proposed transmission line crosses the Mohave Desert Scrub vegetative association. This habitat is dominated by creosote bush with gray krameria (Krameria parvifolia) and cholla (Opuntia bigelovii) also quite common in many places.

In certain areas creosote bush is absent presumably due to certain unfavorable soil conditions; several co-dominant shrubs are present, however. These include Mormon tea (Ephedra sp.), saltbush (Atriplex canescens), and dalea (Dalea sp.).

The proposed route crosses the Virgin River at a point where the river actually runs underground. The area has the appearance of a dry wash with the edges heavily overgrown with tamarisk.

The proposed transmission line corridor crosses the Beaver Dam Mountains through Cedar Wash. Vegetation found along this route reflects the altitudinal changes prevalent through the mountains.

Blackbrush, sagebrush and snakeweed are major constituents of the vegetative communities in the Beaver Dam Mountains. This is fairly rugged terrain with a few deep canyons such as Cedar Wash. The west slope of the Beaver Dam Mountains is mainly creosote with burrobush and joshua trees comprising the dominant vegetation.

This Mojave Desert Scrub community continues along the route of the transmission line to the El Dorado substation with a few variations. Joshua trees are abundant along the route from the Beaver Dam Mountains west to about midway between Mesquite and Glendale, Nevada. West of this area the joshua trees are replaced by spanish dagger (Yucca schidigera). In the vicinity of Glendale and Moapa, Nevada, the corridor will cross the Muddy River. The route appears to bypass most residential buildings, feedlots, and agricultural lands in the vicinity of these towns. The vegetation is dominated by creosote bush and shows signs of disturbance by vehicles and motorcycles.

The corridor crosses the Las Vegas wash which forms one of the few marsh habitats in the Mohave Desert. Water for this unique habitat is mainly effluent from the city of Las Vegas and other communities in the area. Bradley and Niles (1973) have found 111 plant species along the wash. Most of these species were found in the drier areas of the wash. They also observed that in general the plant cover increased in the marsh and shrub-woodland vegetation types but the species diversity decreased. The marsh vegetation type contained only 13% of the plant species found throughout the wash. In marsh areas that Bradley and Niles sampled near the proposed transmission line corridor crossing, cattail (Typha domingensis), tamarisk (Tamarix petandra), arrow-weed (Pluchea sericea), pickle weed (Allenrolfea occidentalis), and salt grass (Distichlis spicata) were the most important components of the marsh vegetative community.

The remainder of the route between Las Vegas and the El Dorado substation is a typical creosote bush - burrobush association. Thornbush (Lycium sp.), gray krameria (Krameria parvifolia), Mormon tea (Ephedra sp.), and many species of cactus are also common to this association.

IIG3a3 Community Successional Stages

Mohave to Moenkopi; Kaiparowits to Eldorado

The majority of the proposed Kaiparowits Transmission line crosses vegetative communities considered to be in a climax stage of vegetational succession. There are some areas that are considered subclimax due mainly to human related disturbances from offroad vehicles, "Range Improvement" projects, and especially cattle grazing.

Climax stages are considered to be those associations or vegetative communities that have evolved through time into a stable relatively permanent vegetation type. Examples of climax communities include most of the Mohave Desert along the transmission corridor with its stable Larrea-Ambrosia association and much of both the Pinyon-Juniper Woodland and Great Basin Desert along the corridor in Arizona and Utah.

There are some areas that are subclimax communities. "Range Improvement" projects west of the Aubrey Valley in Arizona, which involve the removal of juniper trees to promote the growth of grasses, are a noticeable example of a subclimax situation. Removal of the juniper trees results in an unstable community which in time can be expected to return to a woodland community. The presence of cattle in much of the plains grassland between Kingman and Highway 180 south of Grand Canyon maintains this community in a subclimax condition. This is caused by the cattle grazing on the vegetation as well as disrupting the soil. Any such changes to the soil often result in an increase in such species as Russian thistle, snakeweed, rabbitbrush, squirreltail grass, as well as other forbs. These species would normally be replaced, in time, by the more stable climax species, especially the perrenial grasses. However, continued cattle grazing prevents succession from approaching a climax stage and overgrazing actually reverses this process.

A similar subclimax condition exists along the corridor through the "Arizona Strip" between Fredonia and the Hurricane Cliffs. This mixture of Great Basin Desert and Plains Grassland is kept in this subclimax condition due to widespread cattle grazing and subsequent establishment of associated invader plant species previously mentioned.

The Las Vegas Wash marsh community cannot be considered a climax community since its existance depends on the continued supply of effluent water from Las Vegas waste treatment facilities. Without this human related water supply the marsh would again become a normally dry wash in a Larrea-Ambrosia plant association.

There are some relatively small areas that are also maintained in subclimax condition due to their close proximity to human populations and associated disturbances, especially from offroad vehicles. One such area is the Creosote Bush Scrub habitat in the immediate vicinity of Moapa and Glendale which receives enough disturbance to retard the normal growth of plant species associated with this vegetation type.

IIG3a6 Influence of Grazing on Respective Communities

Mohave to Moenkopi

Cattle grazing in much of the area between the Mohave and Moenkopi substations appears to be the major factor affecting the natural vegetation. Vegetation is affected by actual grazing as well as trampling. In some areas such as the Sacramento Valley near Kingman, Arizona, the ground appears to be so thoroughly trampled that any shrub seedlings have little chance of surviving. In this instance vegetation consists almost entirely of mature creosote bushes with nearly all other shrubs noticeably absent especially the younger age classes.

Cattle grazing appears to be a major factor affecting the vegetation in the Pinyon-Juniper Woodland and Plains Grassland. These areas are characterized by a low average annual precipitation of 11 to 18 inches and therefore the annual production is extremely low. These areas cannot support large numbers of cattle and often show signs of overgrazing. This is evidenced mainly by the presence of snakeweed (a shrub), squirreltail grass, and various annuals, such as Russian thistle. In some areas juniper trees have been removed by chaining to promote the growth of grasses for grazing purposes. In view of the low average annual rainfall in much of the area involved, the benefit of such extensive measures seems questionable.

Other grazers such as deer, antelope and rabbits have less of an impact than cattle. However, during periods of severe drought, which are not uncommon in northern Arizona, deer especially can cause severe damage to shrubs by extensive browsing. Deer, antelope, rabbits, and rodents also play a large role in the successful establishment of shrub and herb seedlings. Many of these germinate only in years of adequate moisture conditions only to be eaten by herbivores which relish the tender green seedlings.

IIG3a6 Influence of grazing on Respective Communities

Kaiparowits to El Dorado

Grazing by cattle has the greatest affect on vegetation on the "Arizona Strip" between the area southeast of Fredonia to near the Hurricane Cliffs. Some areas along this section of the line showed signs of overgrazing with Russian thistle very common. Russian thistle was extremely common on heavily trampled ground in a basin sagebrush stand south of Fredonia. Tumbleweeds, the remains of the previous years growh of Russian thistle, were very abundant and piled against the basin sagebrush, fences, and in any gullies. This was a common sight all along the "Arizona Strip". Snakeweed, rabbitbrush, and squirreltail grass also seem to be capable of increasing in over grazed and disturbed areas.

The large numbers of rabbits observed throughout the area indicates that they probably play an important role in grazing on the tender young shrubs and grasses when they sprout.

IIG3a7 Unique Communities

Mohave to Moenkopi; Kaiparowits to El Dorado

The vegetative community near Kingman, Arizona, represents the only area considered unique between the Mohave and Moenkopi substations. It contains a mixture of plants from two major vegetative communities (Mohave Desert Scrub and Pinyon-Juniper Woodland) as well as crucifixion thorn (Canotia holacantha). Crucifixion thorn is a dominant plant in this transition zone and occurs in no other habitats along the route of the transmission line. This community is also unique because of its position with respect to the Colorado River. The Colorado River serves as a major barrier to some plants and animals. However, such factors as increases in altitude and precipitation have a greater influence on the composition of the vegetative communities in this area.

There are five communities considered unique between the Kaiparowits plant site and the El Dorado substation. These unique areas are the Kaiparowits area, Kanab Creek, the Hurricane Cliffs, the Beaver Dam Mountains, and the Las Vegas Wash.

The Kaiparowits region is unique because it encompasses such a diversity of plant associations in varying geological formations such as canyons, benches and plateaus, at various elevations and exposures. In this relatively small area there are basically six major plant associations. These are pinyon-juniper, sagebrush, saltbush, blackbrush, grassland, and riparian. The blackbrush communities are especially important since blackbrush is a relictual species whose range was at one time more widespread but is now limited to certian areas of the Colorado River drainage.

Studies done in this area over the last several years have shown that there are many endemic plant species in this area and that, in general, it is a very rugged, spectacular area unlike any other.

Another unique area is the Kanab Creek crossing southwest of

Fredonia. This creek is particularly interesting biologically because of the different habitats encountered from one side of the creek to the other side. The creek has cut sharply into the ground leaving nearly vertical cliffs about 100 feet high. The sides and higher elevations in the wash are similar in vegetation to that of the surrounding area. Between the cliffs and the wash bottom are sand dunes with sand sagebrush (Artemisia filifolia) one of the prominent species. Below this sand dune area the actual dry wash bottom shows evidence of occasional water flow. In this area rabbitbrush (Chrysothamnus nauseosus) and thread-leaf groundsel (Senecio longilobus) are dominant. Therefore this creek offers an interesting gradient of habitats due to the changes in soil types and plant associations from the tops of the cliffs to the creek bottom.

The Hurricane Cliffs represent another unique community in this area. The rapid change in elevation of over a thousand feet makes this a unique transition zone. This transition zone supports a combination of plant species not found anywhere else along the route of the proposed line. Creosote bush and blackbrush are found at the base of the cliffs, and predominately blackbrush at the top of the cliff. In addition, some unique plant species grow on the rocky cliff crevices. The blackbrush adds to the uniqueness of the area since it is a relictual species and its range is therefore decreasing with time. Bowns (1973) has found that blackbrush only germinates during the most favorable years. Stratification at 4°C for eight days is necessary for successful germination. Bowns has also found that seedlings usually die either as a result of inadequate soil mositure or due to grazing by rodents and rabbits. These factors indicate that this community is extremely slow to revegetate, if at all, in any areas where blackbrush is removed.

The Beaver Dam Mountains are interesting biologically because of the increase in elevation and position near the Mohave and Great Basin deserts. Therefore this area offers a unique blend of plants

associated with both deserts. The many variations in altitudes such as found at Cedar Wash also brings many normally widely separated plants into close association.

Perhaps the most unique community between the Kaiparowits plant site and the El Dorado substation is the marsh community of the Las Vegas Wash. To have such an extensive marsh habitat surrounded by the Mohave Desert is extremely unique. As expected, many plant species exist in this wash that are not found in any other community along the proposed route.

All of these areas because of their location, altitude, soil type, or plant associations are unique, biological areas. These areas support a biota somewhat different from the majority of habitats along the route of the proposed line, and will be investigated further.

IIG3a8 Rare, Endangered, Protected or Unique Species

Mohave to Moenkopi; Kaiparowits to El Dorado

Several plants found along the proposed transmission line route in Arizona are listed as protected species by the Arizona Commission of Agriculture and Horticulture. Inquiries at state and Federal agencies indicate that Nevada and Utah have not designated any plant species as rare, endangered, or protected. Atwood and Welsh (1974) have, however, found several species in the Kaiparowits region in Utah that are endemic to that area.

Protected plants found along the proposed route in Arizona include Yucca brevifolia, Y. shidigera, Y. bacata, Y. angustissima (Y. baileyi), Nolina sp. Atriplex hymenelytra, and Dalea spinosa. Other species on the protected plant list are expected to be found in the future during times of the year when herbaceous plants are more abundant.

Plants listed by Atwood and Welsh as endemic to the Kaiparowits region are Gilia latifolia, Phacelia rotundifolia, Camsonia megalantha, Cleomella palmeriana, Astragalus striatiflorus and Hermedium alipes. Astragalus malacoides, A. ampularius, Phacelia cephalotes, P. mammillarensis, Viguiera soliceps, Nama retrorsum, Psoralea epipsila, and Euphorbia nepradenia are all specific to local geographical formations (Atwood and Welsh, 1974).

Most of these species are important because of their limited ranges combined with such factors as poor or very slow revegetative and growth characteristics. Other species, especially annuals, are also limited in their distribution and only appear during those seasons or years when adequate climatic conditions are met.

IIG3a9 Revegetation Potential

Mohave to Moenkopi; Kaiparowits to El Dorado

Natural secondary succession can be estimated by observations of presently existing disturbances to the environment. Such disturbances include heavily grazed lands, firebreaks, range improvement projects, and various types of unimproved roads. Maintenance roads and access roads along existing transmission lines are most helpful in evaluating secondary succession on future transmission line roads. Observations of several existing unimproved and seldom traveled roads in northern Arizona indicate that natural revegetation occurs very slowly. This is due in part to the specific moisture requirements for germination of many plants and the high probability that such conditions will not occur annually. On many access roads of the recently constructed Navajo-McCullough transmission line Russian thistle (Salsola kali) was the major plant in the early stages of succession. The presence of cattle and even the occasional use of old access roads by vehicular traffic is sufficient in many instances to impede natural secondary succession.

The rehabilitation potential is also extremely doubtful since such extensive measures would have to be taken such as soil replacement, seed dispersal, and methods to optimize germination and seedling survival. Considering the highly variable and unpredictable periods of precipitation in this area, all serious efforts at rehabilitation could ultimately depend on receiving precipitation at a critical time.

Serious efforts to rehabilitate a disturbed habitat are presently being undertaken by Arizona Public Service Company. Various access roads through U.S. Forest Service land along the recently constructed Navajo Project Southern Transmission Line have been reseeded and blocked from use by vehicular travel.

The revegetation potential in the area between the Kaiparowits plant site and the El Dorado substation is expected to be similar to the revegetation potential between the Mohave and Moenkopi substations. Both areas have similar plant communities. Weather conditions determine germination success while herbivores determine the success of seedlings to a large degree.

TABLE

Plant Species List for the
Proposed Kaiparowits Transmission Line

Scientific Name	Common Name	Plant Communities*
	Serrano-Mohave Section	
EPHEDRACEAE		
Ephedra sp.	Jointfir	1,5
MALVACEAE		
Malacothamnus fasciculatus	Mallow	3
ZYGOPHYLLACEAE		
Larrea divaricata	Creosote bush	1
CRUCIFERAE		
Brassica sp.	Mustard	3
CACTACEAE		
Echinocereus triglochidiatus	Hedge hog	1
Ferocactus acanthodes	Barrel cactus	1,5
Opuntia basilaris	Beaver tail	1
Opuntia bigelovii	Teddybear cholla	1
Opuntia ramosissima	Pencil cholla	1
POLYGONACEAE		
Chorizanthe rigida		1
Eriogonum fasciculatum	Wild buckwheat	3,9,1
Eriogonum inflatum	Desert trumpet	1
CHENOPODIACEAE		
Suaeda torreyana	Seep weed	1,2
Atriplex canescens	Fourwind saltbush	1,2,7
Atriplex hymenelytra	Desert holly	5
Salicornia utahensis	Pickleweed	1
PLANTAGINACEAE		
Plantago insularis	Plantain	1
ERICACEAE		
Arctostaphylos glandulosa	Manzanita	3
OLEACEAE		
Fraxinus dipetala	Flowering ash	3
ASCLEPIADACEAE		
Asclepias latifolia	Milkweed	1
SCROPHULARIACEAE		
Mimulus longiflorus	Monkey flower	3,9

TABLE (con't)

Scientific Name	Common Name	Plant Communities
Penstemon longiflorus	Monkey flower	3,9
Penstemon spectabilis		3
LABIATAE		
Marrubium vulgare	Horehound	3
Salvia apiana	White sage	3,9
Salvia mellifera	Black sage	3,9
ROSACEAE		
Adenostoma fasciculatum	Chamise	3,9
Cercocarpus betuloides	Mountain mahogany	3,9
Heteromeles arbutifolia	Toyon	3
LEGUMINOSAE		
Acacia greggii	Catclaw	1
Dalea spinosa	Smoke tree	1
Lotus scoparius	Deerweed	3,9
KRAMERIACEAE		
Krameria parvifolia	Gray krameria	1
FAGACEAE		
Quercus dumosa	Scrub oak	3
Quercus wislizenii	Interior live oak	3
ONAGRACEAE		
Oenothera deltoides	Desert primrose	1
RHAMNACEAE		
Ceanothus crassifolius	California lilac	3
Rhamnus crocea	Redberry	3
RUTACEAE		
Thamnosma montana	Desert rue	1
ANACARDIACEAE		
Rhus laurina	Laurel sumac	3
Rhus ovata	Sugar bush	3,9
Rhus trilobata	Squaw bush	3
RUBIACEAE		
[illegible]alium angustifolium		9
CAPRIFOLIACEAE		
Lonicera interrupta	Honeysuckle	3
Sambucus caerulea	Elderberry	3

TABLE (con't)

Scientific Name	Common Name	Plant Communities
COMPOSITAE		
Ambrosia dumosa	Burrobush	1,5
Artemisia californica	California sage	9
Encelia farinosa	Brittle bush	5
Eriophyllum confertiflorum	Long-stemmed eriophyllum	3
Gutierrezia sp.	Snakeweed	3
Haplopappas squarrosus	Sawtooth goldenbush	3
Helianthus gracilenthus	Slender sunflower	3
AGAVACEAE		
Yucca schidigera	Mohave yucca	1
Yucca whipplei	Our lord's candle	9
GRAMINEAE		
Hilaria rigida	Big galleta	1
	Mohave - Moenkopi Section	
PINACEAE		
Pinus edulis	Pinyon pine	4
CUPRESSACEAE		
Juniperus monosperma		4,6
EPHEDRACEAE		
Ephedra sp.	Jointfir	1,4,7,6
BERBERIDACEAE		
Berberis sp.	Barberry	4
MALVACEAE		
Sphaeralcea sp.	Mallow	1,7,10
ZYGOPHYLACEAE		
Larrea divaricata	Creosote bush	1
LOASACEAE		
Petalonyx sp.	Sandpaper plant	1,7,10
CACTACEAE		
Echinocereus sp.	Hedgehog cactus	1,10
Ferocactus acanthodes	Barrel cactus	1
Opuntia echinocarpa	Golden cholla	1,4,7
Opuntia erinacea	Prickly pear cactus	1,4,7
Opuntia ramosissima	Pencil cactus	1,4,7

TABLE (con't)

Scientific Name	Common Name	Plant Communities
POLYGONACEAE		
Eriogonum sp.	Buckwheat	10,7,4
Eriogonum inflatum	Desert trumpet	1
CHENOPODIACEAE		
Atriplex canescens	Fourwing saltbush	7,6
Eurotia lanata	Winter fat	6,8,1
NYCTAGINACEAE		
Mirabilis sp.	Four-O'Clock	10
PLANTAGINACEAE		
Plantago sp.	Plantain	1
ASCLEPIADACEAE		
Asclepias sp.	Milkweed	10
SOLANACEAE		
Lycium andersonii	Desert thorn	1,6,10,8,7
LABIATAE		
Salazaria mexicana	Bladder sage	1
ROSACEAE		
Coleogyne ramosissima	Blackbrush	8
LEGUMINOSAE		
Acacia greggii	Catclaw	7,10
Astragalus sp.	Locoweed	7
KRAMERIACEAE		
Krameria parvifolia	Gray krameria	4,1,10,7
FAGACEAE		
Quercus turbinella	Shrub live oak	4
CELASTRACEAE		
Canotia holacantha	Crucifixion thorn	7
CUCURBITACEAE		
Curcurbita sp.	Gourd	1
COMPOSITAE		
Ambrosia dumosa	Burrobush	1
Ster tanacetifolia		4,7
Chrysothamnus nauseosus	Rabbitbrush	7

TABLE (con't)

Scientific Name	Common Name	Plant Communities
Encelia farinosa	Brittle bush	1
Gutierrezia sp.	Snakeweed	8,1,4,7
Psilostrophe cooperi	Paperflower	7
AGAVACEAE		
Agave deserti	Desert agave	10
Nolina sp.	Bear grass	10
Yucca baccata	Blue yucca	4,7
Yucca schidigera	Mohave yucca	10
Yucca baileyi	Yucca	7
GRAMINEAE		
Aristida fendleriana	Fendler threeawn	4
Aristida longiseta	Red threeawn	4
Bouteloua curtipendula	Side oats grama	4
Bouteloua eriopoda	Black grama	4,6
Bouteloua gracilis	Blue grama	6,4,7,8
Hilaria belangeri	Curly mesquite	7
Muhlenbergia torreyi	Ring muhley	7
Sitanion hystrix	Squirreltail	7,8
Tridens pulchellus	Fluffgrass	7
	Kaiparowits-Eldorado Sections	
PINACEAE		
Pinus edulis	Pinyon pine	4
CUPRESSACEAE		
Juniperus osteosperma	Utah juniper	4
EPHEDRACEAE		
Ephedra sp.	Jointfir	1,2,4,8,7
Ephedra viridis	Jointfir	4
BERBERIDACEAE		
Berberis fremontia	Barberry	4
MALVACEAE		
Sphaeralcea sp.	Mallow	1,2,7,8
ZYGOPHYLLACEAE		
Larrea divaricata	Creosote bush	1

TABLE (con't)

Scientific Name	Common Name	Plant Communities
EUPHORBIACEAE		
Euphorbia sp.	Spurge	2
LOASACEAE		
Petalonyx sp.	Sandpaper plant	1
CRUCIFERAE		
Lepidium montanum	Peppergrass	4
Stanleya pinnata	Desert plume	2
CACTACEAE		
Echinocereus triglochidiatus	Hedgehog cactus	1,2,4,7,8
Ferocactus acanthodes	Barrel cactus	1
Opuntia basilaris	Beavertail cactus	1
Opuntia bigelovii	Teddy bear cholla	1
Opuntia echinocarpa	Golden cholla	1,4,7,8
Opuntia polyacantha	Prickly pear cactus	1,2,4,7
Opuntia ramosissima	Pencil cholla	1,4
POLYGONACEAE		
Eriogonum sp.	Buckwheat	1,2,4
Eriogonum inflatum	Desert trumpet	1
CHENOPODIACEAE		
Atriplex canescens	Fourwing saltbush	2,7,8
Atriplex confertifolia	Shadscale	7
Eurotia lanata	Winter fat	1,2,7
Salsola kali	Russian thistle	11
Suaeda torreyana	Seep weed	7
ASCLEPIDACEAE		
Asclepias latifolia	Milkweed	11
BORAGINACEAE		
Cryptantha sp.		4
SOLANACEAE		
Lycium andersonii	Desert thorn	1,2,4,7,8
Datura sp.	Gypsum weed	11
ROSACEAE		
Cowania mexicana	Cliff rose	4,11

TABLE (con't)

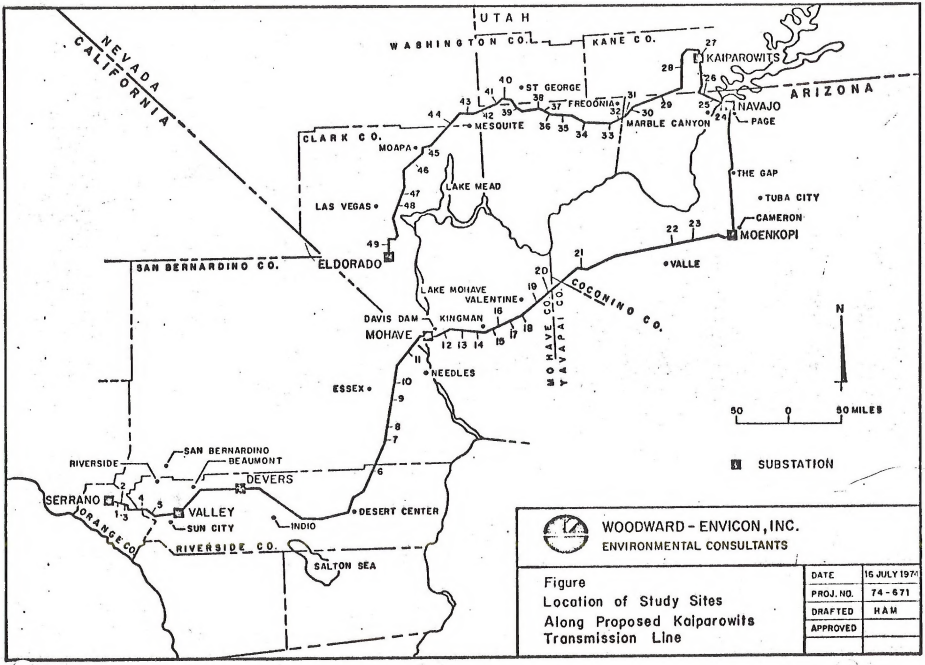
Scientific Name	Common Name	Plant Communities
Coleogyne ramosissima	Blackbrush	2,8
Fallugia paradoxa	Apache plume	11
LEGUMINOSAE		
Astragalus sp.	Locoweed	11
Acacia greggii	Catclaw	1
Dalea sp.	Dalea	1
HYDROPHYLLACEAE		
Eriodictyon angustifolium	Yerba santa	8
KRAMERIACEAE		
Krameria parvifolia	Gray krameria	1, 10
ELAEAGNACEAE		
Shepherdia rotundifolia	Buffaloberry	4
RUTACEAE		
Thamnosma montana	Desert rue	1
COMPOSITAE		
Ambrosia dumosa	Burrobush	1
Artemisia filifolia	Sand sagebrush	
Artemesia tridentata	Basin sagebrush	2,11
Chrysothamnus nauseosus	Rabbitbrush	7,2,11
Gutierrezia sp.	Snakeweed	1,2,8,7,11
Psilostrophe cooperi	Paperflower	11
Senecio longilobus	Groundsel	2
Stephanomeria sp.		
AGAVACEAE		
Agave utahensis	Century plant	11
Yucca baccata	Blue yucca	2
Yucca baileyi	Yucca	7
Yucca brevifolia	Johsua tree	1
Yucca schidigera	Mohave yucca	1
GRAMINEAE		
Aristida sp.	Threeawn	1,11
Aristida longiseta	Red threeawn	7
Bouteloua gracilis	Blue grama	7,8,11
Bromus rubens	Foxtail brome	
Hilaria jamesii	Galleta	7,8,11

TABLE (con't)

Scientific Name	Common Name	Plant Communities
Hilaria rigida	Big galleta	1
Monroa squarrosa	False buffalo grass	1,10
Oryzopsis hymenoides	Indian ricegrass	7,8,10,11
Sitanion hystrix	Squirreltail	2,7,10,11
Sporobolus sp.	Dropseed	7

Plant Communities

1. Creosote Bush Scrub
2. Great Basin Desert Scrub
3. Chaparral
4. Pinyon-Juniper Woodland
5. Ambrosia Scrub
6. Juniper-Grassland
7. Gutierrezia - Grassland
8. Black brush Scrub
9. Coastal Sage Scrub
10. Creosote - Juniper transition zone
11. Plains Grassland - Great Basin Desert Scrub transition zone



WOODWARD - ENVICON, INC.
ENVIRONMENTAL CONSULTANTS

Figure
Location of Study Sites
Along Proposed Kaiparowits
Transmission Line

DATE	16 JULY 197[illegible]
PROJ. NO.	74 - 671
DRAFTED	HAM
APPROVED	

II.H. Animal Communities

II.H.3 Transmission System

a. Terrestrial

1) Big Game

Serrano to Mohave; Mohave to Moenkopi; Kaiparowits to El Dorado.

Two big game species were observed along the proposed Kaiparowits transmission line corridor during the preliminary examination of the route. The species signted were the mule deer (Odocoileus hemionus) and the pronghorn (Antilocapra americana). The mule deer has a wide distribution in the western United States and occurs in all vegetation types traversed by the transmission line route. Its numbers are greatest in the Southern Utah and Northern Arizona portions of the line and decrease significantly in the deserts of California, Nevada, Utah, and Arizona.
The pronghorn prefers open grasslands and shrubby plains to the forests and woodlands along the line. Therefore its distribution is patchy but its numbers sufficient to support huntable herds in Arizona.
In addition to the above big game species two others, the desert bighorn sheep (Ouis canadensis) and the elk (Cervus canadensis) have small localized populations along portions of the transmission line corridor. Desert bighorn populations are concentrated along the mountain ranges bordering the Colorado River, and a small herd occurs in the mountains bordering the Mohave substation. A small elk herd occurs in the Kaibab National Forest north of Williams, Arizona.
The big game species in the Kaiparowits Basin are the Pronghorn and Mule deer, both of which inhabit the Fourmile Bench Area.
The deer on Fourmile Bench are apparently a year-round population and are not part of a herd which migrates onto and off of the bench seasonally.
About mid-Spetember these deer move southward to the rutting grounds on the ends of the benches. After the rutting season, small family groups of 4-15 deer are formed and remain in the canyons and break below Fourmile Bench until spring. During March and April the deer slowly retreat northward to the canyons and breaks for the summer.
The mule deer population has been decreasing in recent

years due to competition with pronghorn for the available food (see section Vegetation section #6-Influence of grazing on respective communities).
The antelope population was introduced into the Clark Bench area as a transplant project from northeast Utah in November 1971. The herd remains essentially in the Cottonwood Canyon and on Clark Bench. The herd's population is currently about one-third of its original size of 104 animals. This substantial reduction is due to predation from the bobcat (Lynx rufus) which is commonly found in the Kaiparowits Basin. In addition, the decline in forage species and competition with deer for available forage species further contributes to its decline.

IIH3a4 Non-Game Species

a)

The proposed Kaiparowits transmission line corridor will proceed from the power plant to Serrano and El Dorado Substations in California and Nevada via the Moenkopi, Mohave and Devers Substations. The characteristic fauna along this transmission corridor is discussed below along three segments: a) Serrano to Devers to Mohave; b) Mohave to Moenkopi, and c) Kaiparowits to El Dorado. These segments cross broad habitat types dictated generally by soil conditions, topography, climate and vegetative associations.

A variety of animal species occur along the transmission corridor ranging from invertebrate animals such as worms, insects and arthropods, to reptiles, birds, and mammals. Several animal species occurring along the transmission line corridor are cosmopolitan and/or wide-ranging such as the coyote, deer mouse, red-tailed hawk, and turkey vulture. Other species are restricted in distribution due to habitat specificity such as the fringe-toed lizards of the sand dunes around Palm Springs and thus may be a measure of existing ecological conditions.

Serrano to Devers - This habitat includes a broad ecotonal area of desert vegetation mixing with chaparral and coastal sage scrub species which extends along the north slopes and washes of the San Jacinto Mountains from Highway III north of Palm Springs to the Idylwild Road (Highway 243); slopes and hills of coastal sage scrub/chaparral vegetation; riparian habitat along the Santa Ana River; and agricultural and old field areas existing in patches from the San Jacinto Valley to the Temescal Valley.

The California ground squirrel is common throughout this segment, especially along disturbed road cuts and abandoned or partially disturbed fields. The deer mouse and cottontail rabbits are also common in all habitats along this segment.

On the slopes and valleys supporting coastal sage scrub/chaparral vegetation, the California pocket mouse, cactus mouse, Pacific kangaroo rat, and dusky-footed woodrat, and to a lesser extent, the San Diego pocket mouse are common. Old fields adjoining the above vegetation types also support the San Diego pocket mouse. Evidence of pocket gopher activity is apparent throughout. Additional terrestrial mammals include raccoons, coyotes, skunks, opossums, California voles and Western harvest mice, among others. The grassy banks away from the river support both pocket gophers, voles, and California ground squirrels.

The dense vegetation of the coastal sage scrub/chaparral supports a variety of birds, the numbers and species of which fluctuate seasonally due to migration patterns. Several birds, however, are characteristic of this habitat and include Costa's hummingbird, wrentit, brown towhee, rufous crowned sparrow, scrub jay, California thrasher and orange-crowned warbler. Raptors such as the red-tailed hawk, sparrow hawk and golden eagle are visitors in the area.

Agricultural and old fields support a number of bird and mammal species which do well around areas of human disturbance and activity. These include ravens, blackbirds, english sparrows, starlings, sea gulls, ground squirrels, rabbits and deer mice. Cosmopolitan predators include coyotes, skunks, hawks, and gopher snakes.

The cosmopolitan and/or wide-ranging animal species along the proposed transmission line corridor (coyotes, gopher snakes, sparrow hawks, english sparrows, gophers and deer mice) are not restricted to any one habitat and are common to many habitats. These animals adapt well to a variety of environmental conditions. However, animal species found in only one or several habitats have usually become adapted to specific factors in their environment and are more sensitive to local perturbations. It is, therefore, these animals that are of primary interest when assessing potential impacts of proposed activities.

Devers to Mohave - Characteristic habitat is desert wash, bajadas (desert alluvial fans), valleys, stabilized and moving sand dunes, and mesquite islands. The vegetation is dominated by creosote bush and burrobush with ironwood a subdominant in the washes.

A variety of small mammals, birds and reptiles are present along this segment of the transmission line corridor. Several species appear to be restricted to, or at least more abundant, in one or two habitat types. For example, the longtail pocket mouse is the most common species in the gravelly and rocky valleys of creosote bush scrub vegetation. This habitat extends from the Vidal HTGR site to Cactus City, excluding the stabilized sand dunes and sandy washes. Merriam's kangaroo rat is also abundant here but appears to be closely associated with the clear, sandy areas in this habitat. The spiny pocket mouse is a species present on the rocky slopes of this vegetation type. In the sandy slopes and washes of the creosote bush scrub the desert pocket mouse is common. The desert woodrat and white-throated woodrat are widespread within this vegetation type occurring wherever suitable material exists for den construction.

In areas where creosote bush scrub exists on sandy soils (east of Indio Hills to the White River Valley north of Palm Springs) the little pocket mouse, desert pocket mouse and desert kangaroo rat are common. In this area the desert woodrat and white-throated woodrat are restricted to the broad washes supporting a palo verde ironwood woodland. In the area of stabilized sand dunes supporting mesquite vegetation, the roundtailed ground squirrel is found. The antelope ground squirrel is widespread throughout the creosote bush scrub.

Characteristic and common lizard species include the collared, leopard, horned, side-blotched and zebra-tailed lizards, in addition to the banded gecko and chuckwalla. In addition, the coachella fringed-toed lizard is restricted to the partially stabilized sand

dune areas in the Coachella Valley. Snakes observed around the Vidal site and probably occurring throughout the creosote bush scrub vegetation include the sidewinder and western diamond back rattlesnakes, western patch-nosed and western shovel-nosed snakes, and the glossy snake, among others. The desert tortoise, a protected species in California, was observed although no dens were located.

The bird species common to the creosote bush scrub along the Devers to Mohave segment of the transmission line include the red-tailed hawk, turkey vulture, shrike, lesser nighthawk, phainopepla, Gambel's quail and the roadrunner. Other birds characteristic of this segment of the transmission line route but not observed include Costa's hummingbird, and blackthroated sparrow.

II.H.3.a.4

Mohave to Moenkopi

This portion of the proposed transmission line corridor will traverse approximately 300 miles of northwestern Arizona. An increase in elevation, i.e., over 5,500 feet, from Mohave to Moenkopi is accompanied by associated changes in temperature regimes and precipitation. Because these climatic changes are important in determing the plant communities, the vegetation also undergoes transition in the region from Mohave to Moenkopi. Large areas of creosote bush scrub in the high desert around Mohave are gradually replaced by pinyon-juniper woodland and plains grassland at higher elevations. As a result of changes in both climatic conditions and flora, composition of the animal community is altered along this section of the transmission line corridor.

Small rodents live-trapped along this section of the corridor and not captured in the Serrano to Mohave section include: the Yuma antelope ground squirre, cliff chipmunk, ord kangaroo rat, Arizona pocket mouse, plains pocket mouse, rock pocket mouse, northern grasshopper mouse, southern grasshopper mouse, and the pinyon mouse.

The northern and southern grasshopper mice were trapped in arid habitats characterized as creosote bush scrub, the creosote-juniper transition zone, and plains grassland. The diet of these rodents includes about 90 percent animal food, of which about 80 percent is arthropods.

The Yuma antelope ground squirrel is an inhabitant of creosote bush scrub and alkali sink habitats. It is found most frequently on rocky or gravelly soil in the Sonoran life zone of the deserts in Arizona. The Yuma antelope ground squirrel is limited in its range to the Arizona side of the Colorado River.

The rock pocket mouse, Arizona pocket mouse and plains pocket mouse are generally found on rocky or sandy soils with scattered sparse vegetation. The rock pocket mouse is especially abundant on rocky slopes and old lava flows.

Both the pinyon mouse and cliff chipmunk are species that occupy pinyon-juniper woodland habitat. In general they are restricted in distribution due to their habitat specificity and thus may be a measure of existing ecological conditions.

The silky pocket mouse occurs in grasslands and pinyon-juniper woodland on sandy or occasionally rocky soils. The silky pocket mouse was most common in pinyon-juniper woodland as exemplified by live-trapping results at sites 20 and 23 (Table).

Other small mammals observed but not trapped in the section from Mohave to Moenkopi include the white-tailed praire dog and badger. The white-tailed praire dog is usually found in open or slightly brushy country and sometimes in widely dispersed pinyon-juniper. It was observed to be most common on plains grasslands along this section of the transmission line corridor. The badger occupies habitat characterized as open grasslnad or desert. Along this section of the corridor sightings were rare. Most sightings of badger activity were made in the Great Basin Desert Scrub more typical of the section of the corridor between Kaiparowits and El Dorado.

The creosote bush scrub and creosote-juniper transition zone supports a variety of birds already discussed under the section Serrano-Mohave. Birds observed in the pinyon-juniper and plains grassland not mentioned in that section include: Gambel's quail, pinyon jay, western kingbird, burrowing owl, Scott's oriole, and the curve-billed thrasher.

Characteristic and most commonly observed lizard species in the creosote-juniper transition zone include the collared lizard, desert-horned lizard, leopard lizard, western whiptail, side-blotched, and zebra-tailed. Only one species of lizard was commonly observed on the plains grassland, the lesser earless lizard. The desert spiny lizard was observed occasionally in the pinyon-juniper woodland.

II.H.3.a.4

Kaiparowits to El Dorado

This portion of the transmission line corridor traverses 500 miles through northern Arizona, southern Utah and southwestern Nevada. The corridor remains at the 4,000 to 6,000 foot level for most of the distance between Kaiparowits and St. George. Pinyon-juniper, the primary vegetative association at the higher elevations is intermixed with great basin sagebrush and grasslands at lower elevations. Blackbrush associations exist in localized areas. The western half and terminal segment of the corridor steadily drops in elevation and passed through the creosote bush scrub community as it enters the Mohave Desert.

The quantity and variety of mammalian fauna observed varied only slightly from the Mohave to Moenkopi section. This was probably a result of the climatic factors and the vegetative communities remaining somewhat similar to conditions on the Mohave-Moenkopi section. Great basin desert scrub, a vegetative association not found in the two previous sections, did afford some new habitat with characteristic fauna not observed previously.

Both the great basin kangaroo rat and the ord kangaroo rat are commonly found in sagebrush scrub and shadscale scrub in the Upper Sonoran life zone. The great basin kangaroo rat is sometimes observed in pinyon-juniper. Generally the two small rodents, as is true of most kangaroo rats, prefer open sandy to loamy soils with sparse vegetation. Along this section of the transmission line they were trapped in both plains grassland and great basin scrub. Other small rodents caught in livetraps included; the canyon mouse, cactus mouse, western harvest mouse, grasshopper mice and the ubiquitous deer mouse.

The pinyon-juniper and great basin scrub communities support a variety of bird life already discussed in previous sections and enumerated in Table . Species not mentioned in the above sections and observed for the first time in this section of the corridor include; the common bushtit, plain titmouse, black-throated gray warbler, gray vireo, cassin's kingbird and the chipping sparrow.

Small mammals other than rodents observed in this section were similar in variety to the previous section of the corridor, Table . Badger were sighted frequently in open areas characterized by great basin scrub. The badger prefers friable soils where it preys upon ground squirrels, rats, mice and chipmunks.

Lizards commonly observed in the great basin desert scrub included the western whiptail, side-blotched lizard, desert-horned lizard and the collared lizard (Table).

II. H.3.a.5 Raptor Populations

Birds of prey expected to occur along the proposed transmission line corridor include two species of eagles, eight species of owls, and twelve species of hawks and falcons. Many of these birds occur along grassland, desert scrub, pinyon-juniper woodland, and areas of low vegetation. Most of these birds are not restricted to any specific habitat type and therefore enjoy a broad areal distribution.

Raptors observed along the transmission line from June]-July]5, 1974 included the red-tailed hawk (Buteo jamaicensis), Cooper's hawk, (Accipiter cooperii), American kestrel (Falco sparverius), burrowing owl (Speotyto cunicularia), Swainson's hawk (Buteo swainson), and golden eagle (Aquila chrysaetos) Several species occur in the southwest only at certain times of the year. Below are notes on the seasonal occurence of raptors for the Kaiparowits Basin extracted from Brigham Young University field notes.

The golden eagle, a fully protected species under federal law, is a common bird of prey during the winter months in the Kaiparowits Basin. The bald eagle (Haliaeetus leucocephalus) is also a winter resident. This raptor is however, found only in the vicinity of Lake Powell, Lake Mead and other sections of the Colorado River.

Spring and summer residents include the sharp-shinned hawk (Accipiter striatus), marsh hawk (Circus cyaneus) and ferruginous hawk (Buteo regalis) They have been observed in the low lying areas of the desert scrub and in the creek flood plains. Summer residents also include the red-tailed hawk, American kestrel, and cooper's hawk. The peregrine falcon (Falco peregrinus) and prairie falcon (Falco mexicanus) are year-round residents which prefer the higher benchlands and canyons of the Kaiparowits Basin.

Owls are not frequently observed in the Kaiparowits Basin. The great horned owl (Bubo virginianus) prefers cliffs and canyons, the long eared owl (Asio otus) the pinyon-juniper woodland, and the burrowing owl prefer to nest in road banks and abandoned rodent burrows. These owls are probably year-round residents of the Kaiparowits Basin and of the entire transmission line corridor.

II.H.3.a.6

Threatened Terrestrial Animals

a) Mammals

There are no threatened mammal species disignated by Federal law along the proposed Kaiparowits transmission line route. In California, however, there is a rare species of kangaroo rat, Dipodomys stephensi which occurs only in the San Jacinto valley ~~basin~~ which the proposed transmission line will cross. The present development of this valley for agricultural use and urban dwellings will soon result in the destruction of all available habitat. It is doubtful that the Stephens kangaroo rat can successfully compete with the Pacific kangaroo rat, which has a wider distribution and is the common species in the coastal valleys and mountains.

b) Birds

Protected species of birds along the proposed route include three raptor species as well as the clapper rail, and the yellow-billed cuckoo.

The three raptor species, southern bald eagle (Haliaectus l. leucocephalus), American peregrine falcon (Falco peregrinus anatum), and prairie falcon (Falco mexicanus) are lawfully protected by the U.S. Department of Interior. Utah and California have also classified the southern bald eagle and American peregrine falcon as endangered and are thus fully protected by law.

Neither of the species was observed during surveys of June 1-July 15, however Brigham Young University field personnel have reported occasional sightings but not in their study sites.

The clapper rail (Rallus longirostris) and the yellow-billed cuckoo (Coccyzus americanus) occur along the Colorado River of California and Arizona. Because of extensive waterfront development and human activity along the river in these two states the habitat of these birds is rapidly disappearing and the bird populations are declining.

c) Reptiles and Amphibians

A fully protected species of reptile under California law is the desert tortoise, Gopherus agazzisii which occurs in the deserts of eastern California, western Arizona, and the southern tips of Utah and Nevada. Because of its large size and slow movements this tortoise has been exploited by man for many years. Recently, with the increased human pressure and activity in these deserts, this species has suffered most. Its range is probably not diminishing but its numbers are declining rapidly due to taking for pets and killing by off-road vehicles.

The following species of reptiles and amphibians, although not protected by state or federal law, have limited distributions in the southwestern states and may occur along the proposed transmission line route:

Flat-tailed horned lizard (Phrynosoma m'calli) - California
Granite spiny lizard (Sceloporus orcutti) - California
Colorado desert sand lizard (Uma notata) - California
Coachella sand lizard (Uma inornata) - California
California rock lizard (Uta mearnsi) - California
Arizona night lizard (Xantusia arizonae) - Arizona
Gila monster (Heloderma suspectum) - Arizona

TABLE ____

Reptiles Observed Along the Proposed Kaiparowits Transmission Line - June 1 - July 15, 1974

Site No.	Plant Community	Common Name	Scientific Name
1	Chaparral	Coast Horned Lizard	Phrynosoma coronatum
		Western Fence Lizard	Sceloporus occidentalis
3	Coastal Sage Scrub	Striped Racer	Masticophis lateralis
7	Creosote Bush Scrub	Western Whiptail	Cnemidophorus tigris
9	Creosote Bush Scrub	Leopard Lizard	Crotaphytus wislizenii
		Zebra-tailed Lizard	Callisaurus draconoides
10	Creosote Bush Scrub	Desert Tortoise	Gopherus agassizi
		Desert Horned Lizard	Phrynosoma platyrhinos
11	Creosote Bush Scrub	Banded Gecko	Coleonyx variegatus
		Side-blotched Lizard	Uta stansburiana
		Spotted Leaf-nosed Snake	Phyllorhynchus decurtatu
		Zebra-tailed Lizard	Callisaurus draconoides
15	Creosote Bush Scrub	Collared Lizard	Crotaphytus collaris
		Zebra-tailed Lizard	Callisaurus draconoides
16	Creosote-Juniper Transition Zone	Collared Lizard	Crotaphytus collaris
		Zebra-tailed Lizard	Callisaurus draconoides
17	Creosote-Juniper Transition Zone	Collared Lizard	Crotaphytus collaris
		Desert Horned Lizard	Phrynosoma platyrhinos
		Leopard Lizard	Crotaphytus wislizenii
		Western Whiptail	Cnemidophorus tigris
		Side-blotched Lizard	Uta stansburiana
		Zebra-tailed Lizard	Callisaurus draconoides
18	Pinyon-Juniper Woodland	Desert Spiny Lizard	Sceloporus magister
21	Plains Grassland	Lesser Earless Lizard	Holbrookia maculata
22	Plains Grassland	Lesser Earless Lizard	Holbrookia maculata
28	Great Basin Desert Scrub	Western Whiptail	Cnemidophorus tigris
		Side-blotched Lizard	Uta stansburiana
30	Great Basin Desert Scrub	Desert Horned Lizard	Phrynosoma platyrhinos

TABLE ____ (continued)

Site No.	Plant Community	Common Name	Scientific Name
32	Great Basin Desert Scrub	Desert Spiny Lizard	Sceloporus magister
33	Great Basin Desert Scrub	Collared Lizard	Crotaphytus collaris
36	Creosote Bush Scrub	Collared Lizard Desert Horned Lizard Desert Iguana	Crotaphytus collaris Phrynosoma platyrhinos Dipsosaurus dorsalis
38	Creosote Bush Scrub	Desert Horned Lizard Leopard Lizard	Phrynosoma platyrhinos Crotaphytus wislizenii
39	Creosote Bush Scrub	Western Whiptail	Cnemidophorus tigris
40	Great Basin Desert Scrub	Collared Lizard Zebra-tailed Lizard	Crotaphytus collaris Callisaurus draconoides
41	Creosote Bush Scrub	Western Whiptail	Cnemidophorus tigris
47	Creosote Bush Scrub	Desert Horned Lizard	Phrynosoma platyrhinos

TABLE ____

Birds Observed Along the Proposed Kaiparowits Transmission Line - June 1 - July 15, 1974

Site No.	Plant Community	Common Name	Scientific Name
1	Chaparral	Anna's Hummingbird	Calypte anna
		Bewick's Wren	Thryomanes bewickii
		Black-tailed Gnatcatcher	Polioptila melanura
		Brown Towhee	Pipilo fuscus
		California Quail	Lophortyx californicus
		House Sparrow	Passer domesticus
		Mourning Dove	Zenaidura macroura
		Red-tailed Hawk	Buteo jamaicensis
		Roadrunner	Geococcyx californianus
		Scrub Jay	Apheloc ma coerulescens
		Wrentit	Chamaea fasciata
3	Coastal Sage Scrub	Brown Towhee	Pipilo fuscus
		California Quail	Lophortyx californicus
		California Thrasher	Toxostoma redivivum
		Cooper's Hawk	Accipiter cooperii
		House Finch	Carpodacus mexicanus
		Anna's Hummingbird	Calypte anna
		Mourning Dove	Zenaidura macroura
		Red-shafted Flicker	Colaptes cafer
		Rufous-sided Towhee	Pipilo erythrophthalmus
		Scrub Jay	Aphelocoma coerulescens
		Turkey Vulture	Cathartes aura
4	Coastal Sage Scrub	Ash-throated Flycatcher	Myiarchus cinerascens
		Bewick's Wren	Thryomanes bewickii
		Blacktailed Gnatcatcher	Polioptila melanura
		Brown Towhee	Pipilo fuscus
		Mockingbird	Mimus polyglottus
		Phainopepla	Phainopepla nitens
		Common Raven	Corvus corax
		Western Meadowlark	Sturnella neglecta
5	Chaparral	Mourning Dove	Zenaidura macroura
		Phainopepla	Phainopepla nitens
		Red-tailed Hawk	Buteo jamaicensis
		Roadrunner	Geococcyx californianus
		Rufous-sided Towhee	Pipilo erythrophthalmus
		Scrub Jay	Aphelocoma coerulescens

TABLE ____ (continued)

Site No.	Plant Community	Common Name	Scientific Name
10	Creosote Bush Scrub	Red-tailed Hawk	Buteo jamaicensis
11	Creosote Bush Scrub	Common Nighthawk	Chordeiles minor
14	Wash	Gambel's Quail	Lophortyx gambelii
		Mourning Dove	Zenaidura macroura
		Piñon Jay	Gymnorhinus cyanocephala
		Western Kingbird	Tyrannus verticalis
15	Creosote Bush Scrub	American Kestrel	Falco sparverius
		Black-throated Sparrow	Amphispiza bilineata
		Burrowing Owl	Speotyto cunicularia
		Gambel's Quail	Lophortyx gambelii
		Scott's Oriole	Icterus parisorum
		Shrike	Lanius sp.
		Turkey Vulture	Cathartes aura
16	Creosote-Juniper Transition Zone	Gambel's Quail	Lophortyx gambelii
		Turkey Vulture	Cathartes aura
17	Creosote-Juniper Transition Zone	Bewick's Wren	Thryomanes bewickii
		Black-throated Sparrow	Amphispiza bilineata
		Cactus Wren	Campylorhynchus brunneicapillum
		Curve-billed Thrasher	Toxostoma curvirostre
		Gambel's Quail	Lophortyx gambelii
		Horned Lark	Eremophila alpestris
		House Finch	Carpodacus mexicanus
		Mourning Dove	Zenaidura macroura
		Say's Phoebe	Sayornis saya
		Shrike	Lanius sp.
		Western Kingbird	Tyrannus verticalis
18	Pinyon-Juniper Woodland	Gambel's Quail	Lophortyx gambelii
19	Pinyon-Juniper Woodland	Mourning Dove	Zenaidura macroura
		Common Raven	Corvus corax
	Pinyon-Juniper Woodland	Shrike	Lanius sp.

TABLE ____ (continued)

Site No.	Plant Community	Common Name	Scientific Name
21	Plains Grassland	American Kestrel	Falco sparverius
		Burrowing Owl	Speotyto cunicularia
		Horned Lark	Eremophila alpestris
		Mourning Dove	Zenaidura macroura
		Raven	Corvus corax
		Red-tailed Hawk	Buteo jamaicensis
		Shrike	Lanius sp.
		Western Meadowlark	Sturnella neglecta
22	Plains Grassland	American Kestrel	Falco sparverius
		Cliff Swallows	Petrochelidou pyrrhonota
		Common Nighthawk	Chordeiles minor
		Horned Lark	Eremophila alpestris
		Loggerhead Shrike	Lanius ludovicianus
		Pinon Jay	Gymnorhinus cyanocephala
		Common Raven	Corvus corax
		Western Meadowlark	Sturnella neglecta
26	Pinyon-Juniper Woodland	Cassin's Kingbird	Tyrannus vociferans
		Mourning Dove	Zenaidura macroura
		Turkey Vulture	Cathartes aura
27	Pinyon-Juniper Woodland	Bewick's Wren	Thryomanes bewickii
		Black Phoebe	Sayornis nigricans
		Black-throated Gray Warbler	Dendroica nigrescens
		Chipping Sparrow	Spizella passerina
		Common Bushtit	Psaltriparus minimus
		Gray Vireo	Vireo vicinior
		Pinon Jay	Gymnorhinus cyanocephala
		Plain Titmouse	Parus inornatus
		White-throated Swift	Aeronautes saxatalis
29	Pinyon-Juniper Woodland	Ash-throated Flycatcher	Myiarchus cinerascens
		Bewick's Wren	Thryomanes bewickii
		Chipping Sparrow	Spizella passerina
		Common Bushtit	Psaltriparus minimus
		Plain Titmouse	Parus inornatus
30	Great Basin Desert Scrub	Black-throated Sparrow	Amphispiza bilineata
		Lesser Nighthawk	Chordeiles acutipennis
		Loggerhead Shrike	Lanius ludovicianus

TABLE ____ (continued)

Site No.	Plant Community	Common Name	Scientific Name
33	Great Basin Desert Scrub	Mourning Dove	Zenaidura macroura
		Turkey Vulture	Cathartes aura
34	Great Basin Desert Scrub	Horned Lark	Eremophila alpestris
		Mourning Dove	Zenaidura macroura
		Common Raven	Corvus corax
35	Great Basin Desert Scrub	American Kestrel	Falco sparverius
		Horned Lark	Eremophila alpestris
		Mourning Dove	Zenaidura macroura
		Phoebe	Sayornis sp.
		Common Raven	Corvus corax
		Red-tailed Hawk	Buteo jamaicensis
		Shrike	Lanius sp.
		Swainson's Hawk	Buteo swainsoni
		Western Meadowlark	Sturnella neglecta
		White-throated Swift	Aeronautes saxatalis
36	Creosote Bush Scrub	Black-throated Sparrow	Amphispiza bilineata
		Golden Eagle	Aquila chrysaetos
		Red-tailed Hawk	Buteo jamaicensis
38	Creosote Bush Scrub	Horned Lark	Eremophila alpestris
		Roadrunner	Geococcyx californianus
		Western Kingbird	Tyrannus verticaulis
40	Great Basin Desert Scrub	American Kestrel	Falco sparverius
		Black-throated Sparrow	Amphispiza bilineata
		Cactus Wren	Campylorhynchus brunneicapillum
		Gambel's Quail	Lophortyx gambelii
		Mourning Dove	Zenaidura macroura
		Roadrunner	Geococcyx californianus
		Thrasher	Toxostoma sp.
		White-throated Swift	Aeronautes saxatalis
41	Creosote Bush Scrub	Ash-throated Flycatcher	Myiarchus cinerascens
		Black-throated Sparrow	Amphispiza bilineata
		Canyon Wren	Catherpes mexicanus
		Gambel's Quail	Lophortyx gambelii
		Mourning Dove	Zenaidura macroura
		Red-tailed Hawk	Buteo jamaicensis
		Shrike	Lanius sp.
		Violet-Green Swallow	Tachycineta thalassina
		White-throated Swift	Aeronautes saxatalis

TABLE ____

Mammals Observed Along the Proposed Kaiparowits Transmission Line - June 1 - July 15, 1974

Site No.	Plant Community	Common Name	Scientific Name
1	Chaparral	Desert cottontail	Sylvilagus audubonii
3	Coastal Sage Scrub	Desert cottontail	Sylvilagus audubonii
4	Chaparral	Blacktail jackrabbit Desert cottontail	Lepus californicus Sylvilagus audubonii
5	Chaparral	Desert cottontail	Sylvilagus audubonii
9	Creosote Bush Scrub	Antelope ground squirrel	Ammospermophilus leucurus
11	Creosote Bush Scrub	Blacktail jackrabbit	Lepus californicus
14	Wash	Blacktail jackrabbit	Lepus californicus
16	Creosote-Juniper Transition Zone	Mule deer	Odocoileus hemionus
17	Creosote-Juniper Transition Zone	Blacktail jackrabbit Desert cottontail	Lepus californicus Sylvilagus audubonii
19	Pinyon-Juniper Woodland	Coyote	Canis latrans
20	Pinyon-Juniper Woodland	Blacktail jackrabbit Mule deer	Lepus californicus Odocoileus hemionus
21	Plains Grassland	Desert cottontail Pronghorn antelope Whitetail prairie dog	Sylvilagus audubonii Antilocapra americana Cynomys gunnisoni
22	Plains Grassland	Desert cottontail	Sylvilagus audubonii
27	Pinyon-Juniper Woodland	Desert cottontail Mule deer	Sylvilagus americana Odocoileus hemionus
29	Pinyon-Juniper Woodland	Mule deer	Odocoileus hemionus
30	Great Basin Desert Scrub	Coyote	Canis latrans
32	Great Basin Desert Scrub	Badger	Taxidea taxus
34	Great Basin Desert Scrub	Badger	Taxidea taxus
35	Great Basin Desert Scrub	Blacktail jackrabbit Desert cottontail	Lepus californicus Sylvilagus audubonii

TABLE ____ (continued)

Site No.	Plant Community	Common Name	Scientific Name
40	Great Basin Desert Scrub	Bat	Myotis sp.
		Blacktail jackrabbit	Lepus californicus
		Desert cottontail	Sylvilagus audubonii
41	Creosote Bush Scrub	Blacktail jackrabbit	Lepus californicus
		Desert cottontail	Sylvilagus audubonii

TABLE ____

Quantitative Rodent Data Live-Trapped Along the Proposed Kaiparowits Transmission Line

Site	Species	No. of Captures M	F	Undet.	Total
	MOHAVE TO MOENKOPI				
Creosote Bush Scrub					
13	Cactus Mouse	4	5	5	14
	Desert Woodrat	1	3		4
	Northern Grasshopper Mouse		1		1
	Rock Pocket Mouse	5	1		6
	Yuma Antelope Squirrel	1			1
15	Merriam Kangaroo Rat	8	3	3	14
	Northern Grasshopper Mouse	1			1
Wash Transition Zone					
	Arizona Pocket Mouse	7	2	1	10
	Merriam Kangaroo Rat	5	1		6
	Northern Grasshopper Mouse	1			1
	Whitethroated Woodrat			1	1
Creosote-Juniper Transition Zone					
16	Arizona Pocket Mouse	1	2	1	4
	Cactus Mouse		2		2
	Desert Woodrat		1		1
	Merriam Kangaroo Rat	1			1
	Southern Grasshopper Mouse	2			2
17	Arizona Pocket Mouse	2		2	4
	Cactus Mouse	5	4		9
	Merriam Kangaroo Rat	1		1	2
	Southern Grasshopper Mouse	2	1	1	4
	Whitethroat Woodrat	1	1		2
Pinyon-Juniper Woodland					
20	Arizona Pocket Mouse	2	2		4
	Pinon Mouse	14	2		16
	Silky Pocket Mouse	6	1	2	9
23	Cliff Chipmunk	1		1	2
	Deer Mouse	11	10	2	23
	Piñon Mouse	5	2		7
	Silky Pocket Mouse	2		1	3

TABLE ____ (continued)

Site	Species	No. of Captures M	F	Undet.	Total
Plains Grassland					
21	Deer Mouse	1			1
	Northern Grasshopper Mouse	11	1	2	14
	Ord Kangaroo Rat	17	14	1	32
	Western Harvest Mouse	2			2
22	Deer Mouse	2		1	3
	Northern Grasshopper Mouse	1			1
	KAIPAROWITS TO ELDORADO				
Creosote Bush Scrub					
36	Canyon Mouse	10	14	3	27
	Desert Woodrat	2	6	1	9
	Longtailed Pocket Mouse	10	4	1	15
	Whitetailed Antelope Ground Squirrel	3	2	2	7
38	Cactus Mouse	9	2		11
	Canyon Mouse	1	1		2
	Longtailed Pocket Mouse	26	10		36
	Merriam Kangaroo Rat	7	6		13
	Yuma Antelope Squirrel	7	3		10
41	Canyon Mouse	2	4	1	7
	Desert Woodrat	2			2
	Longtailed Pocket Mouse		6		6
Pinyon-Juniper Woodland					
26	Deer Mouse	1			1
	Little Pocket Mouse	1			1
Plains Grassland					
25	Ord Kangaroo Rat		3		3
Great Basin Desert Scrub					
24	Deer Mouse			1	1
	Little Pocket Mouse	2	2		4

TABLE ____ (continued)

Site	Species	No. of Captures M	F	Undet.	Total
Great Basin Desert Scrub (continued)					
30	Deer Mouse	16	5		21
	Ord Kangaroo Rat	9	7	1	17
	Western Harvest Mouse	4	1		5
	Whitetailed Antelope Ground Squirrel	1			1
32	Canyon Mouse	1	2		3
	Deer Mouse	2	2		4
	Desert Woodrat	3			3
	Little Pocket Mouse	6	1		7
	Longtailed Pocket Mouse	3			3
	Northern Grasshopper Mouse		1		1
	Ord Kangaroo Rat	3	2		5
33	Deer Mouse	3	3		6
	Little Pocket Mouse	7	3		10
	Ord Kangaroo Rat	2			2
34	Deer Mouse	2			2
	Northern Grasshopper Mouse		1		1
	Western Harvest Mouse	1	1		2
35	Canyon Mouse	17	9	3	29
	Desert Woodrat	1			1
	Great Basin Kangaroo Rat	1			1
	Longtailed Pocket Mouse	11	3		14
	Whitetailed Antelope Ground Squirrel		2	1	3
40	Cactus Mouse	1	2	1	4
	Canyon Mouse	4	4	2	10
	Deer Mouse	9	5		14
	Great Basin Kangaroo Rat	2	5		7
	Northern Grasshopper Mouse	1			1
	Whitetailed Antelope Ground Squirrel	2	1		3

TABLE ____

Rodent Live-Trap Statistics Along The
Proposed Kaiparowits Transmission Line

Site	Habitat	Trap Nights	No. Traps	Total Captured	% Trap Success
1	Chaparral	3	64	136	71
3	Coastal Sage Scrub	3	64	97	50
5	Chaparral	1	60	17	28
6	Creosote Bush Scrub	1	33	5	15
7	Creosote Bush Scrub	1	33	15	45
9	Creosote Bush Scrub	1	33	16	48
10	Creosote Bush Scrub	1	33	16	48
11	Creosote Bush Scrub	1	33	21	64
13	Creosote Bush Scrub	1	33	26	79
14	Wash	1	33	18	55
15	Creosote Bush Scrub	1	27	15	56
16	Creosote-Juniper Transition Zone	1	33	10	30
17	Creosote-Juniper Transition Zone	1	33	21	64
20	Pinyon-Juniper Woodland	3	64	29	15
21	Plains Grassland	3	64	49	26
22	Plains Grassland	1	64	4	6
23	Pinyon-Juniper Woodland	2	64	35	27
24	Great Basin Desert Scrub	1	20	5	25
25	Plains Grassland	1	20	3	15
26	Pinyon-Juniper Woodland	1	20	2	10
30	Great Basin Desert Scrub	2	64	44	34
32	Great Basin Desert Scrub	1	64	26	41
33	Great Basin Desert Scrub	1	64	18	28
34	Great Basin Desert Scrub	2	64	5	4
35	Great Basin Desert Scrub	2	64	48	38
36	Creosote Bush Scrub	2	64	58	45
38	Creosote Bush Scrub	2	64	62	48
40	Great Basin Desert Scrub	2	64	39	30
41	Creosote Bush Scrub	1	64	15	23

TABLE ____

Rodents Live-Trapped Along the Proposed
Kaiparowits Transmission Line

Scientific Name	Common Name	Plant Communities*
	MOHAVE TO MOENKOPI	
Ammospermophilus harrisi	Yuma Antelope Squirrel	3
Eutamias dorsalis	Cliff Chipmunk	4
Dipodomys merriami	Merriam Kangaroo Rat	3, 6, 10
Dipodomys ordi	Ord Kangaroo Rat	6
Perognathus amplus	Arizona Pocket Mouse	3, 4, 6, 10
Perognathus flavescens	Plains Pocket Mouse	4
Perognathus intermedius	Rock Pocket Mouse	3
Neotoma albigula	Whitethroated Woodrat	6, 10
Neotoma lepida	Desert Woodrat	3
Onychomys leucogaster	Northern Grasshopper Mouse	3, 5, 6, 10
Onychomys torridus	Southern Grasshopper Mouse	3, 6
Peromyscus eremicus	Cactus Mouse	3, 6
Peromyscus maniculatus	Deer Mouse	4, 5, 6
Peromyscus truei	Pinon Mouse	4
Reithrodontomys megalotis	Western Harvest Mouse	6
	KAIPAROWITS TO ELDORADO	
Ammospermophilus leucurus	Antelope Ground Squirrel	3, 8
Dipodomys merriami	Merriam Kangaroo Rat	3
Dipodomys microps	Great Basin Kangaroo Rat	8
Dipodomys ordi	Ord Kangaroo Rat	5, 6, 7, 9
Perognathus formosus	Long-tail Pocket Mouse	3, 8, 9
Perognathus longimembris	Little Pocket Mouse	4, 5, 6, 8, 9
Neotoma lepida	Desert Woodrat	8, 9
Onychomys leucogaster	Northern Grasshopper Mouse	5, 6, 8, 9
Peromyscus crinitus	Canyon Mouse	3, 8, 9
Peromyscus eremicus	Cactus Mouse	3, 8
Peromyscus maniculatus	Deer Mouse	4, 5, 6, 7, 8, 9
Reithrodontomys megalotis	Western Harvest Mouse	5, 6, 7

* See next page

TABLE ____ (continued)

*Plant Communities

1. Chaparral
2. Coastal Sage Scrub
3. Creosote Bush Scrub
4. Pinyon-Juniper Woodland
5. Grassland
6. Gutierrezia
7. Great Basin Sagebrush
8. Black Brush Scrub
9. Canyon
10. Wash

Environmental Impacts of Proposed Action

IIIG.3.a Terrestrial

Preliminary information concerning the proposed Kaiparowits Transmission Line indicates construction of the transmission line will have various impacts on the environment. These impacts will result from the implementation of construction procedures associated with building a 500 KV transmission line. Such development procedures include the construction of:

1. Access roads
2. [redacted]
3. Tower site clearings
4. Tower assembly clearings

Construction of the proposed transmission line will result in the loss of habitat within all of the vegetative communities encountered. The area of the various habitats disturbed by the clearing of each tower site and for tower assembly locations is basically the same through all vegetation associations due to the approximately equal size of tower clearings and distance between towers.

The area of habitat disturbed by the construction of access [redacted] roads as well as the impacts due to these roads will vary according to the accessibility of the area and the vegetative community. Since much of the proposed transmission line will follow an existing corridor access roads to existing transmission lines will be used whenever possible. This will greatly reduce the amount of habitat lost during construction. The separation distance between parallel transmission lines (those now existing and this proposed line) in the existing corridor will require the construction of some additional connecting access roads to the various sites associated with the Kaiparowits Transmission Line.

The impact on the vegetation will vary with the vegetative community encountered and the amount of habitat disturbed. Preliminary evaluation indicates the impact will be greatest in those areas requiring extensive clearing of vegetation such as in Pinyon-Juniper Woodland or where many new access roads will be needed. In some areas such as near the Kaiparowits plant site and in the Beaver Dam Mountains the line does not follow an existing corridor and will require several new access roads. These areas are in extremely rough terrain and will probably require relatively extensive access roads to avoid canyons and plateaus. Therefore the impact of transmission line construction in these areas will be considerably greater than in similar vegetative communities on level terrain.

Construction activities with lower initial impacts but with long-term impacts are expected to occur in the Mohave Desert areas where the shrubs are widely spaced, the herbaceous ground cover is very low, and much of the terrain is relatively level. Such areas will require a relatively small amount of clearing. Recovery of the vegetation will, however, be very slow. Based on preliminary information concerning vegetative cover and densities, the impact of the propos transmission line in the Plains Grassland and Great Basin Desert Scrub vegetative communities will, in general, be greater than the impact in the Larrea-Ambrosia association of the Mohave Desert. On the other hand it will be less than the impact in the Pinyon-Juniper Woodland. Local conditions including topographic and edaphic factors as well as the amount and type of plant cover will influence the magnitude of the actual impact.

IIIG3a2 Community Composition

The various construction related disturbances will have both short-term and long-term effects on community composition. Tower site clearings usually involve less of a disturbance and often result in only short-term impacts. This is due to the fact that the existing vegetation is not always completely removed from the tower sites. In addition, they do not receive the heavy vehicle use that an access road receives. Therefore the plant community composition will not be altered as severely as would be expected on access roads.

Access roads are considered to have long-term impacts on the vegetation. Vegetation is completely removed and the surface soils are disturbed and compacted by grading and vehicle use. Access roads are also frequently used by the public after completion of transmission line construction in order to gain access to formerly inaccessible areas. The density, frequency and cover of vegetation on access roads are therefore reduced to near zero and remain very low for extended periods of time.

IIIG3a3 Community Successional Stages

The construction of the proposed 500 KV transmission line will disturb the vegetative communities within the transmission line corridor. Most of the plant and animal habitats crossed by the transmission line are considered to be stable climax communities that have evolved through time. Construction activity, by removing much of the vegetation, will greatly disrupt the stability of the associations within the transmission line corridor. In the process of succession various annuals such as Russian thistle (Salsola kali) and other weedy species are expected to represent the first stage in the succession of the disturbed areas, along much of the proposed transmission line route. Theoretically, the invading annuals will in time be replaced by a series of other species until the stable climax community is again dominant. This probably will not occur on many of the disturbed areas such as the access roads since they are, and will be, used by off-road vehicles enough to prevent succession from progressing beyond the first stages.

IIIG3a5 Community Relationships to Soil and Moisture

Construction procedures will have an impact on the soil and the moisture availability that affects the growth of plants in the disturbed areas. In most cases the surface soil is disrupted by grading and then is compacted by the traffic of heavy vehicles. This tends to make the soil unsuitable for many of the perennial climax species. Usually annual species with less specific soil requirements such as annual species of buckwheat (Eriogonum spp.), various annual mustards, and Russian thistle are frequently capable of growing in the disturbed soil.

Moisture reaching the ground in disturbed areas may be prevented from normal absorption due to construction related changes in the soil characteristics (i.e., soil compaction, and vegetation removal). Access roads on sloping terrain further complicate these changes by increasing the probability of soil erosion due to a channelization effect on run off. Occasionally water erosion can be expected to wash out young seedlings before they can become sufficiently established and therefore reduce the rate of natural revegetation.

IIIG3a6 Influence of Grazing on Respective Communities

The construction of a 500 KV transmission line is not expected to have a major impact on the already existing association between grazers and the respective plant communities through which some vegetation palatable to livestock will be removed during construction of the various roads. However, an access road is a relatively narrow strip of land in proportion to the size of most range lands and should not require any reductions in the number of cattle per unit area. Cattle have been observed using access roads for cow trails and tower sites to lie under during the day. This habit may be encouraged by the loose soil since there is little shade under the towers. The possibility exists that some weedy plant species such as locoweed (Astragalus sp.), that invade disturbed areas during the early successional stages of revegetation may be harmful to livestock.

Cleared areas used during construction would be expected to provide additional browse for deer during the early successional stages, as it is during this time that young herbaceous plants, acceptable to the deer as forage, become established.

IIIG3a7 Unique Communities

Preliminary investigations of unique communities indicates that the impact of the construction of the proposed 500 KV transmission line will have on the various unique communities (see IIG3a7) is especially important. Since most such communities are relatively small and not found in any other place, the construction of a transmission line may further reduce the already limited habitat in these areas.

Several of these unique communities (Kaiparowits area, Hurricane Cliffs, Beaver Dam Mountains) have been somewhat protected from disturbances due to their isolated locations and general lack of passable roads. Access roads into these areas will increase the probability of human visitation and associated habitat disturbance.

The proposed transmission line is not expected to have a major impact on the Las Vegas Wash marsh habitat. The proposed route crosses the marsh at approximately a right angle so that the amount of habitat disturbed will be minimal. Since an access road is not expected to be built across the marsh and no towers are to be placed in the marsh, the impact to the marsh community is not expected to be significant.

IIIG3a8 Rare, Endangered, Protected or Unique Species

Construction of the proposed transmission line may destroy many individuals of plant species recognized as protected plants by the Arizona Commission of Agriculture and Horticulture (1972). Other endemic and rare species such as those indicated by Atwood and Welsh (1974) and the California Native Plant Society (1974) may also occasionally be destroyed. This probability remains to be evaluated when specific areas to be cleared are defined more accurately.

The largest groups of protected plants that may be impacted by construction of the proposed transmission line includes various yucca and cactus species. Removal of these plants will be significant since they are such conspicuous members of the various plant communities through which the transmission line will pass. Due to the large number of individuals expected to be destroyed and the extremely slow rate of germination and growth, the cacti may be the most seriously impacted group of species.

IIIG3a9 Revegetation Potential

Mitigation of long-term impacts due to construction related vegetation removal is biologically the most important consideration, other than minimizing the area of disturbance during construction. Revegetation or rehabilitation of disturbed areas is essential if these areas are to be returned to conditions approximating those prevailing prior to construction. Revegetation or rehabilitation of disturbed areas in arid and semi-arid environments is extremely difficult especially in the case of access roads. Natural revegetation can be expected to be extremely slow along much of the proposed transmission line (in those areas subjected to disturbance) due to the disruption of the soil surface, compaction of the soil and low precipitation. Rehabilitation techniques such as top soil replacement, soil preparation, and seeding are not clearly defined for some vegetation associations (i.e., creosote bush scrub, desert wash, etc.). The arid climate of the Southwestern United States makes successful revegetation or rehabilitation difficult. Germination and seedling survival are highly dependent on receiving adequate precipitation during the appropriate temperature and photo period regime. Seedlings are also very susceptible to herbivores. These factors make successful revegetation or rehabilitation extremely difficult, but does not lessen the importance of attempts of revegetation or rehabilitation in mitigation of the construction impacts and promotion of the re-establishment of natural plant communities.

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III.H.3.a

Construction and installation of the transmission line will result in some alteration of wildlife associations. These changes will result from the necessary construction of access and maintenance roads and the clearing of areas at tower sites and at staging locations.

III.H.3.a.1

Big Game

Herbivores such as the mule deer, pronghorn antelope, and elk should not be significantly affected by the proposed loss of habitat. Most of these animals have large summer and winter ranges, of which the transmission line corridor area is not likely to comprise a significant portion for any specific animal. As grass and shrubs species are restored, these species will be attracted to the corridor and may be expected to again utilize the right-of-way vegetation as a food source.

If construction occurs during the time of year when newborn animals are present it is possible that animals could be separated from or abandoned by the adult. This is not viewed as a probable frequent occurrence and thus the impact would be small.

III.H.3.a.4

Non-Game Animals

- Small mammals - Small carnivores such as coyote and badger generally have large home ranges over which they regularly move. Such areas may include several habitat types. The loss of a small portion of the home range within the transmission line right-of-way will probably have a minimal impact.

On the other hand, certain species such as rabbits tend to have small ranges and are generally restricted to the region immediately surrounding their burrows. Where the corridor passes through these territories and actual construction takes place the impact will be significant, but temporary. Rabbits will return to the right-of-way soon after construction ceases and the population may increase over preconstruction levels as grasses and shrubs revegetate. In the case of species with natural low population densities such as badger, recovery could take up to several generations because of the low reproductive rate. Populations of rabbit, bobcat, coyote and other abundant species should recover quickly to preconstruction levels.

- Small rodents - Removal of vegetation will have the greatest affect on herbivores such as small rodents. These animals rely on vegetation as a food source as well as for cover. Rodent burrows will also be destroyed in areas cleared for roads and tower sites. Some of these animals will be destroyed during the clearing process because these species have small home ranges and tend to retreat to their burrows when disturbed or threatened. Other animals will be forced to move into adjacent undisturbed areas possibly stressing existing populations. Many of these animals will not survive under these conditions of increased competition for food, territories, and home ranges.

Most of the above impacts may be mitigated so that they are only of short-term duration because of the high reproductive potential and short generation time of most of these species. Hence, the corridor construction zones are likely to be rapidly re-invaded. Changes in species compostion may occur due to a change in habitat. For example, for those species which tolerate open space and sparse vegetation (Dipodomys spp) clearing may enhance their population.

III.H.3.d.4.b

Avian Fauna

The loss of habitat should have a minimal and temporary adverse impact on most birds foraging in the right-of-way. The area involved will probably constitute only a small proportion of the total area in which they normally forage, except for the species that require the diversity of feed and cover provided by the right-of-way ecotone. Some small birds will defend territories which may be located primarily within the corridor. When the vegetation is removed, these birds will leave but will probably be unable to establish territories elsewhere, due to the established presence of other individuals. This will limit the chances of reporduction success for displaced birds.

Nesting sites of birds which occur within the proposed right-of-way construction zones will be destroyed. Consequently, some eggs or young birds will be lost or abandoned. This impact is considered to be localized and temporary.

An additional impact will be some mortality from bird species flying into transmission lines after construction is complete. This is also considered of minimal impact.

The possibility of some species using the towers as nesting sites and perching locations may be of limited beneficial impact.

III.H.3.a.4.c

Reptiles and Amphibians

Most reptiles and amphibians are motile and many will escape from the path of construction equipment. Others will be killed or injured, particularly species which may have retreated to dens or

nests within the right-of-way. The loss of these individuals will have an immediate impact on the local population but will diminish as other individuals invade the site after construction ceases.

Where all shrub growth is removed, snakes may not readily reoccupy the area due to the lack of shelter from the sun.

III.H.3.a.4.d

Invertebrate Populations

Invertebrates - Except for moths, butterflies, and other groups of winged insects, most ground arthropods in the corridor would not be able to escape during the clearing and construction, and would therefore be destroyed. However, the impact on the populations of these species as a whole would be insignificant because most are widespread, numerically abundant, have high reproductive potential, and short generation time.

III.H.3.5

Birds of Prey

The loss of habitat will affect birds of prey (raptors) in two ways, though the impacts will generally be temporary. Where vegetation is removed from the construction zone, suitable habitat for resident small mammals, birds, reptiles, and amphibians will be eliminated. Thus, populations of these prey animals will be low or non-existent. This will cause a minimal reduction in the total food available to raptors. However, small animals crossing the cleared space will more readily observed by raptors and thus become more vulnerable.

Second, there may be a short-term adverse impact on breeding and nesting or raptors. Construction disturbance may cause individuals

near the corridor to abandon their nests. In the case of more common species such as red-tailed hawks, and sparrow hawks, loss of a few birds from a relatively large population will probably have a minimal and temporary impact.

However, in the case of less common or rare species (peregrine falcon, golden eagle, bald eagle, and the praire falcon) loss of only a few birds may represent a significant reduction in the total population. Several generations would be required for the normal population of these species to return to preconstruction levels, and the impact if incurred would be regarded as moderate to severe and long-term.

a) Mammals

The Kangaroo rat, Dipodomys stephensi, is classified as rare as its population size and distribution are diminishing. These decreases are probably a result of competition with the Pacific Kangaroo rat and reduction of habitat due to urban encroachment. Further disruption due to the transmission line construction will contribute to the species diminishing habitat. As the species is forced into adjacent undisturbed areas, competition with the Pacific Kangaroo rat will take place. This impact may be lessened by the fact that the Stephens' Kangaroo rat reinvades disturbed areas when they become suitable for habitation. In these previously disturbed areas the population size may be maintained at a higher level than existed on the undisturbed habitat.

b) Birds

In the threatened species of birds, (peregrine falcon, golden eagle, southern bald eagle, prairie falcon, clapper rail, yellow-billed cuckoo) the loss of only a few birds may represent a significant reduction in the total population. Several generations would be required for the normal population of these species to return to preconstruction levels. However, it is most likely these very mobile species would avoid the corridor while construction takes place and make use of adjacent undisturbed habitat. Therefore, only minimal impact is expected during the construction phase.

Where vegetation is removed from the construction zone, suitable habitat for small mammals, birds, reptiles, and amphibians will be eliminated. Thus, populations of these prey animals will be low or non-existent. This will cause only a minimal reduction in the total food available for these far-ranging birds of prey. Therefore the impact of vegetation removal is also considered to be minimal.

c) Reptiles and Amphibians

Most of the reptiles listed as endangered for the State of Arizona are motile and many of these individuals will escape from the path of construction equipment. Others will be killed or injured, particularly species which may have retreated to dens or nests within the transmission line corridor. The loss of these individuals will have an immediate impact on the local population but will diminish with time if nearby populations are of sufficient size to supply individuals to reinvade the corridor after construction ceases.

Both the desert tortoise and gila monster are relatively large bodied and slow moving reptiles. Because of their lack of mobility these animals may be more susceptible to injury resulting from construction activity than the motile lizards listed above. In addition, both these animals have been exploited by man in the past (i.e. collecting for pets and museum collections) and any such activity by construction crews should be discouraged.